

University of Southern Queensland

**The nature and extent of internet-enabled e-business
adoption by Australian wineries, and factors affecting this
adoption**

A dissertation submitted by

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For the award of

Master of Information Technology

August 2004

Abstract

This research investigates the nature and extent of e-business adoption by Australian wineries in order to describe the activity and increase understanding of the factors influencing the behaviour.

Pilot study interviews grounded the research and provided industry-based direction for the survey. A census survey of the 2003 population of Australian wineries, excluding micro-wineries, used a self-administered mail questionnaire. Response rate varied by winery size, from 15% of small wineries up to 46% of very large wineries. Data was collected in five e-business process domains: e-mail, external web sites, and winery B2C web sites, extranets, and intranets; on perceptions of influence of four factors in each process domain: 1) relative advantage, 2) resource capacity, 3) supply chain activity, and 4) government activity; and on barriers to further adoption.

Analysis of the survey responses supported the proposition that the nature and extent of adoption varies significantly by winery size. In general, small wineries find less benefit than larger wineries. Customer type and level of customer power also vary by winery size with winery B2C web strategies differing as a result. The proposition that the factors influencing e-business adoption vary between different types of e-business was also supported. This finding indicates that customised frameworks for particular e-business process domains will have increased relevance, and generalisations regarding the level of influence individual factors have on e-business adoption per se are inappropriate.

Influence from the activities of supply chain and government organisations, the subject of the third and fourth propositions, was also found. The impact level of these external environment factors increased with winery size. In particular it is the powerful business customers and the Australian Government that drive some of the e-business adoption by wineries.

Criticism of low levels of adoption by Australian small and medium sized enterprises in government funded reports appears harsh when applied to small and medium wineries after findings demonstrate that they derive less benefit from e-business than larger wineries. Reduction of the most common barriers to increasing adoption - the high cost and low quality of network connections in regional locations – remains the responsibility of government.

CERTIFICATION OF DISSERTATION

I certify that the ideas, results, analyses and conclusions reported in this dissertation are entirely my own effort, except where otherwise acknowledged. I also certify that the work is original and has not previously been submitted for any other award, except where otherwise acknowledged.

Signature of Candidate

Date

ENDORSEMENT

Signature of Supervisor

Date

ACKNOWLEDGEMENTS

A number of people have helped me throughout this research process and I take this opportunity to acknowledge their help and thank them for their kindness and generosity. To my first supervisor, Professor Edmond Fitzgerald, many thanks are owed. His kind and wise advice through the first two thirds of this research guided the research design and direction, while our long conversations regarding research and life in general are remembered fondly. My second supervisor, Associate Professor Mark Toleman, provided extremely valuable help in all areas of the dissertation. Special thanks go to Mark for providing such timely responses to various drafts along the way, for the useful advice regarding data analysis and writing skills, and for having such a wonderfully calm and friendly nature.

My department, faculty and other USQ colleagues also provided me with much support and encouragement along the way, and I thank them sincerely for their kindness and concern. In particular I thank Janelle McPhail for her advice during the development of the survey instrument. Also I thank the University of Southern Queensland for the financial support provided to me during the conduct of this research. I am extremely appreciative of the period of academic leave and for funding conference attendance and costs associated with the interviews and the survey.

Last, I wish to thank my husband Tony and my children Sam, Ben and Nicola for their unflinching love, support and their confidence in me during the time I have worked on this dissertation.

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1 Introduction

This chapter provides the foundation for the dissertation. Firstly background information on the potential impact of e-business for the Australian economy is presented. The significance of further research into the factors influencing e-business adoption is then established, leading onto an explanation of the research problem, with justification provided on both theoretical and practical grounds. The selection of the wine industry as the specific area for the conduct of the research is explained. This is followed by an outline of the structure of the report and discussion of key terms. A discussion on the delimitations and scope of the research is followed by concluding remarks.

1.1 Background and significance of the research

Section 1.1 provides background information on the general problem area with regard to economic and industry impact of e-business adoption and begins to lay the foundation for the significance of this research. The role of e-business in the Australian economy is briefly discussed, along with possible consequences and benefits and rate of uptake. The selection of the wine industry as the particular context is also discussed.

1.1.1 E-business and its perceived importance for the Australian economy

Much has been written about the uptake, benefits, barriers and consequences of e-business (NOIE 2000; Parker & Papandrea 2002; Rodgers, Yen & Chou 2002). The Australian Government, through various departments and agencies, promotes the adoption of e-business by Australian Small and Medium sized Enterprises (ASMEs) in particular (Brown 2002) because of the perceived benefit that e-business is expected to contribute to the future of the Australian economy. The economic effects of e-business adoption are described under a variety of labels such as 'new' (Porter 1998), 'online' (Dunt & Harper 2002), 'Information' and 'Internet' (Allen Consulting Group 2002). Michael Porter's (2001, p. 65) claim that '*Internet technology provides better opportunities for companies to establish distinctive strategic positionings than did previous generations of information technology*' supports the high confidence shown in e-business by government bodies and many business analysts (Anderson 2000; NOIE 2000).

The Australian Government, through organisations such as NOIE (The National Office for the Information Economy), RIRDC (Rural Industries Research and Development Corporation) and national consumer organisations funded by government such as SETEL (Small Enterprise Telecommunications Centre) acting as proponents of change, champion the uptake of e-business for the good of the Australian economy and health of Australian business.

1.1.2 E-business adoption and change in business and industry structures

A review of the literature identifies e-business as a transforming technology that results in significant changes for businesses (Bakry & Bakry 2001; Porter 2001; Srinivasan, Lilien & Rangaswamy 2002; Tetteh & Burn 2001). It is commonly accepted that adoption of e-business has the potential to alter industry structures and business models (Mahadevan 2000; Srinivasan, Lilien & Rangaswamy 2002; Wen, Chen & Hwang 2001). Examples of new business models made possible by the growth of e-business are online exchanges, consortia, and e-markets (Hoffman, Keedy & Roberts 2002).

E-business is also considered by some as a disruptive technology requiring a paradigm shift for which no adequate prescription or formula has yet been developed, and which challenges managers to re-think, re-define, re-examine, re-engineer and re-invent business strategies and processes (Dhillon, Cossa & Hackney 2001; Lee 2001). Considered from this point of view, strategic planning is made all the more difficult because of the uncertainty of factors to be considered, and the unknown consequences that will result (Porter 2001).

The potential of e-business to fundamentally change business structures and to have wide industry impact implies that individual business decisions on adoption and the related consequences are complex in nature. Many factors need to be considered and taken into account. The sources of these factors are also many and varied, and it is possible that not all sources of factors have as yet been identified in the current research literature.

1.1.3 Commonly cited benefits resulting from e-business adoption

Two major benefits of e-business adoption are commonly identified as (Allen Consulting Group 2002; OECD 2002):

- Reduced costs; and
- Increased demand through increased services and new markets.

These benefits directly flow from the Internet's intrinsic characteristics of providing low-cost and high-speed global communication, effectively reducing the limiting impact of geographic position, and extending presence in the marketplace to twenty-four hours a day, seven days a week.

Other related benefits of e-business adoption promoted or marketed by NOIE are increased competitive advantage, provision of new ways of generating revenue, improved relationships with suppliers, improved services to clients, increased collaboration in the supply-chain, and improved business practices through the development of new business models built around the capability of networking (NOIE 2002). The list of potential benefits as identified by those championing increased adoption of e-business practices for the good of the Australian economy is long and far-ranging in scope. However, it is unrealistic to think that all of the potential benefits will be delivered to all those adopting e-business practices as the degree of delivered benefit will be dependent on many contextual factors, including the level of adoption. Indeed, the assessment of e-business benefits is acknowledged to be complex, and includes a combination of direct and indirect, and short and long-term benefits (Poon & Swatman 1997).

1.1.4 Judging the rate of e-business adoption by Australian businesses

The rate of uptake of e-business by Australian businesses in general, and ASMEs in particular, is judged by government agencies such as NOIE as slow (NOIE 2000), and "not commensurate with expectations" (Brown 2002, p. 3). The adoption and diffusion rates of e-business in practice do not match the adoption rates that the government desires. Government reports into the use of e-business by small and medium size enterprises suggest that while the potential benefits of e-business are significant, for example by improving competitiveness via increased revenue and reduced costs, many businesses do not appreciate the relevance or opportunity that e-business presents. Furthermore, the reports suggest that businesses are risking failure by their lack of initiative and entrepreneurial behaviour (Brown 2002; NOIE 2000, 2002; Parker & Papandrea 2002).

A sizeable gap in the perceptions of the level of benefits that result from e-business use appears to have emerged between the theorists and analysts on the one hand, and many of the business practitioners on the other hand. Why is there this difference in perceptions, confidence levels and expectations of benefits from e-business adoption? Is it possible that the descriptions in the popular press, government reports and journal articles of the positive potential benefits deriving from e-business uptake are to some extent exaggerated and have contributed to the sense of hype that surrounds the area? Is it a case of the proponents of change, critical of current adoption rates, having the luxury of espousing substantial benefits while not actually having to implement any changes themselves or make any business investments of their own? Are Australian businesses really at fault here in not recognising the potential benefits of e-business and not adopting at a pace that ensures the reaping of the benefits of e-business so confidently predicted by government analysts and some academics? The lack of clear answers to these questions helped motivate this research, in the hope that gathering extensive and detailed information about how e-business was being used and why would provide useful insights into these questions.

1.1.5 Need for better understanding of factors influencing current e-business adoption rates in Australia

In order to improve the understanding of the current state of e-business adoption levels in Australia it is important to have an accurate picture of what is happening in practice and to uncover the major reasons for this behaviour. As the range of factors acting as drivers or inhibitors of e-business adoption levels are better understood, the theory relating to this adoption can be developed to better reflect practice. Increased understanding of practice should provide improved knowledge on which to base future strategic decisions relating to e-business adoption. In order to investigate e-business adoption at a detailed level within the time and cost constraints of this research project, the research context is limited to a single organisation type within a single industry. The selection of wineries within the Australian wine industry is discussed next.

1.1.6 Selecting the wine industry as the research context and winery as the unit of analysis

The first reason for selecting the wine industry is its growing importance to the Australian economy. The wine industry continues to enjoy a boom period of growth that has lasted since the early 1990's, largely due to exponential growth in export sales which in turn make a valuable contribution to the Australian economy. Refer to Appendix A for further details on the wine industry, and specifically to Figure A-2 for growth sale trend information. The continued success of the wine industry, the profitability of the increasing number of wineries and the contribution of their business operations to the national economy and regional Australia now depends to a large extent on continued export growth and the maintenance of the supply/demand ratio within acceptable limits (McGrath-Kerr Business Consultants Pty Ltd 2002). The importance of the industry is also increasing as the number of wineries in Australia continues to grow, with the largely regional nature of the industry providing valuable employment and tourism opportunities in country areas (ACIL 2002). Many of the larger companies also have corporate centres in capital cities, providing them with access to better network infrastructure than is available in most rural locations. This provides an opportunity to investigate and compare the influence of physical network access and costs between regional and city locations.

A second reason for choosing the wine industry is the diversity and wide range of business processes involved, with activities ranging from the agricultural (primary), manufacturing (secondary) and marketing (tertiary) sectors making it a rich subject for research. Wineries usually have a high level of involvement in all three areas, with different levels of skills and competence in each of them (ACIL 2002). The individual wine company is therefore selected as the unit of analysis in this study.

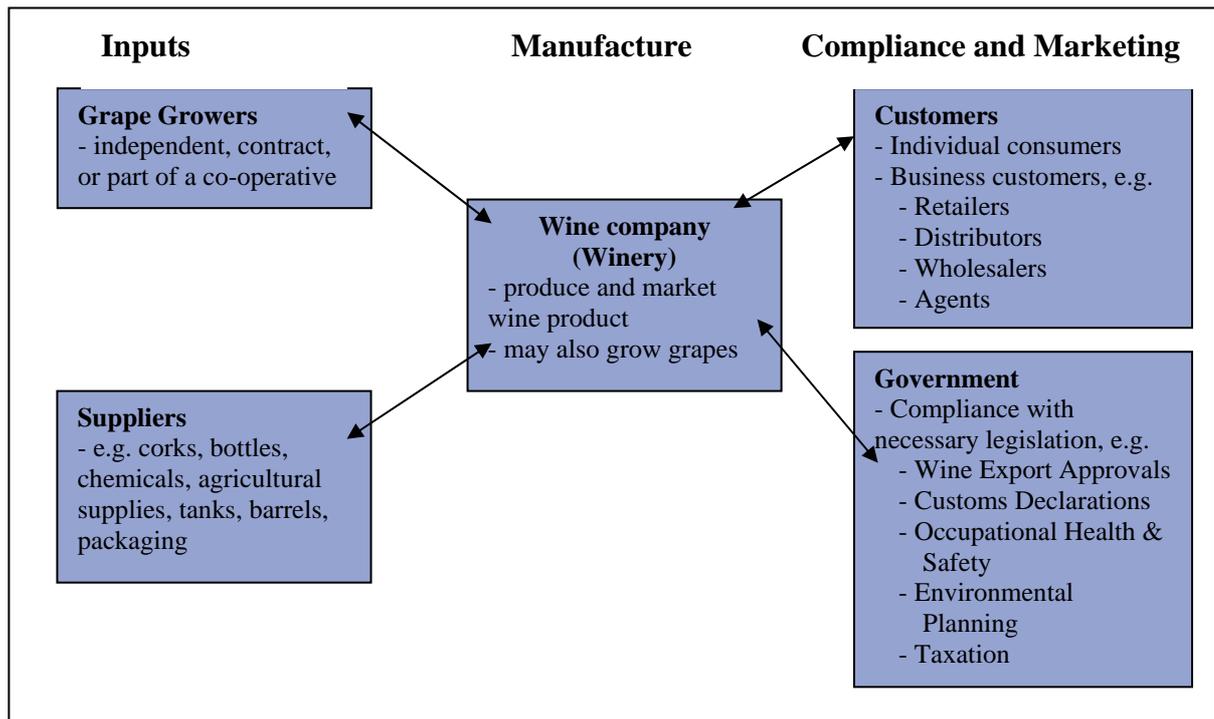


Figure 1-1 Winery's central position and range of transactional relationships

Source: developed for this research

Wineries hold a central position within their industry, as illustrated in Figure 1-1. The scope of activities undertaken by most wineries ranges from involvement on the agricultural production side, either through growing grapes themselves or liaising with grape growers, through to the manufacture of wine, with all of the attendant procurement activities involved in that stage, to the final marketing of the finished product (either bulk or bottled) to both business and individual customers. The wineries are also subject to compliance with a wide range of legislative requirements during the conduct of many of their business activities, and this represents another area of activity which may be affected by e-business options.

Thirdly, a gap in the research literature concerning e-business adoption issues by wineries was identified. A substantial review was conducted of literature and secondary data relating to the history and present state of the Australian wine industry.

- A number of studies with an economic or business strategy focus were found, but not many studies specifically investigate the use of e-business by wineries. In particular no study covering wineries in all regions of Australia was found, nor was a study found that covered a full range of e-business

activity types. The main focus to date has been on business to customer (B2C) winery web sites.

- Contact was also made with Mr David Spencer, the research economist responsible for wine industry analysis with the Australian Bureau of Agricultural and Resource Economics (ABARE). ABARE is located in Canberra, and is a professionally independent Australian Commonwealth government economic research agency. Mr Spencer confirmed in a personal e-mail communication that no study into the use of e-business by wineries had been conducted by ABARE and that he was not aware of any studies on this topic from other government related sources.
- Similarly, a telephone conversation with Professor Kym Anderson from the Centre of International Economic Studies at the University of Adelaide, who has published a number of papers related to the economics of the wine industry, suggested that little research had been conducted in the area of e-business use by wineries.

Findings from this preliminary review stage suggested that little empirical research had been undertaken concerning e-business use by wineries. Filling this particular gap in the research literature will improve understanding of the major forces that influence e-business adoption behaviour by Australian wineries in particular, as well as providing further insight into the actual benefits that are being delivered to wineries as a result of e-business related behaviours. The research findings will be immediately relevant for wineries and the wine industry in general. It is also likely to have some relevance for increased understanding of e-business adoption by other businesses in other industries as some of the issues, processes and contexts will be common across other business scenarios.

1.2 Research Question

The purpose of this research is to discover the actual extent and nature of e-business adoption within a particular group of businesses, the reported benefits, and the reasons this is so. This information will lead to a better understanding of the factors acting as drivers of or barriers to adoption and diffusion rates of e-business. The research will have a strong empirical focus within the context of Australian wineries.

Taking into account the general research problem of interest, and the selection of an appropriate area of investigation, the specific research question is now stated:

What is the nature and extent of internet-enabled e-business adoption by Australian wineries, what factors affect this adoption, and why is this so?

Further clarification of the research question is now provided. The inclusion of the phrase ‘nature and extent’ requires that e-business cannot be discussed in general terms as a discrete object, but must be described with a reasonable amount of detail at a process and purpose level. For example, the research needs to be able to differentiate between the e-business adoption levels of one winery which only uses e-mail with a few individual customers compared with another winery that uses e-mail to communicate with a range of suppliers, business customers and distribution partners, as well as operating three types of web sites – one for the general public, one for relevant business organisations within their supply and value chains, and another for their own staff. Detailed information about *how* e-business is being used, and with *whom*, and *why* will be gathered to collectively describe the nature and extent of e-business adoption. This information will also be used to both identify the adoption factors relevant to wineries and both qualitative and quantitative data will be collected to improve understanding of why these factors act as drivers or inhibitors, which is the focus of the last half of the research question.

1.3 Justification for the research

First, as discussed in section 1.1.6, research into e-business use by wineries is limited and this study will provide national-level information that is currently not available as demonstrated by the literature review in chapter two. Filling this gap in the literature is one reason for conducting this research. The findings will be of particular relevance and value for wineries requiring additional guidance on e-business adoption decisions. The provision of useful information to the wine industry in general is further justification for the work due to the increasing economic importance of the industry to regional, export and tourism development in Australia.

Second, the additional empirical research into e-business adoption by Australian wineries is likely to extend understanding of the factors acting as drivers or inhibitors of Internet-enabled e-business for a wider range of business contexts than just the

specific area under study, due to the commonality of many of the different types of business processes involved.

Third, this research will collect rich data on a very broad range of Internet-enabled e-business behaviours in order to obtain a relatively complete picture of how e-business is being used in a wide range of contexts – e.g. business to consumer (B2C), business to business (B2B), business to government (B2G) as well as internally within the business. It also gathers data on behaviour on a wider range of process domains (e.g. e-mail, public web-sites, intranets, extranets) than is generally included in e-business research.

Fourth, this research will make a contribution to theory development related to the adoption of e-business specifically, as opposed to innovations in general and information technology (IT) in general. See section 1.5.1 for a discussion on what constitutes e-business and its various characteristics.

1.4 Outline of research methodology

An outline of the research processes that have been followed is shown below in Figure 1-2. The research process began with the identification of the general research area, and a gradual narrowing down of the research problem. Consideration of the research problem led to a search of available literature on various theoretical frameworks for IT adoption and diffusion in general, with particular attention paid to studies which were empirically based and had an e-business and/or Australian context.

Having identified the wine industry as the context for this research, and finding that little significant research had been conducted on a national level and which included the largest wineries, a multi-method research methodology was selected as most appropriate. The research methodology, described in detail in Chapter Three, consists of two distinct phases: a qualitative, exploratory stage using interviews designed to identify key issues of relevance to the winery industry; and a quantitative survey stage, using a self administered questionnaire, designed to collect descriptive information in order to gain a clearer understanding of e-business activity and test propositions. The research approach allowed both qualitative and quantitative data collection methods to be employed, thus allowing for significant industry feedback to inform the final selection of relevant factors and issues for further detailed study using a quantitative approach.

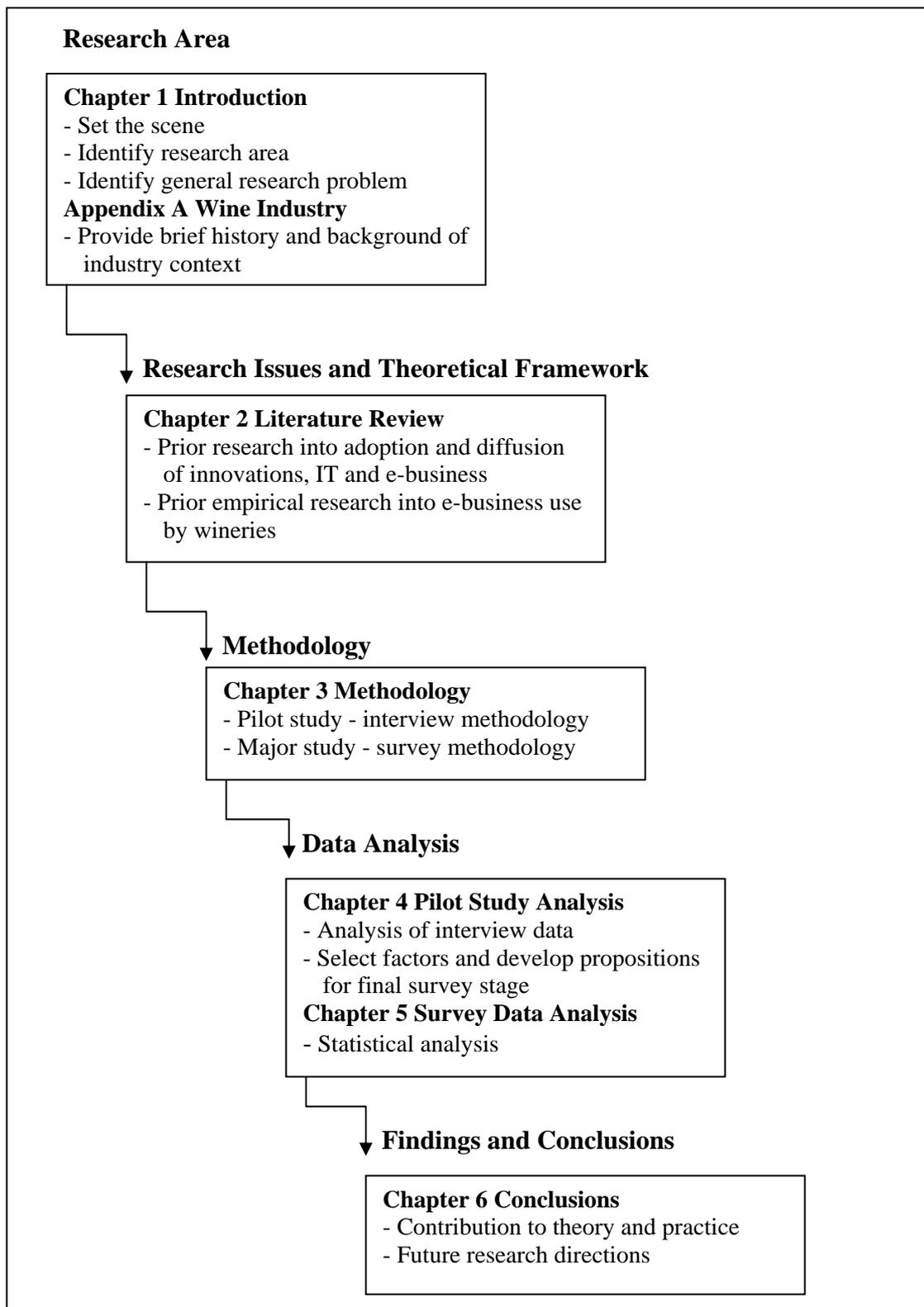


Figure 1-2 Research Process

1.5 Discussion of terms

Many of the terms used in the conduct of this research are commonly used in multiple contexts and often with slightly different or ill-defined meanings. Discussion of some of the more important terms is now presented in order to clarify how these terms are being used in this research.

1.5.1 E-business and e-commerce

The terms 'e-business' and 'e-commerce' are often used interchangeably with each other, and many general definitions can be found using either term, as the following examples illustrate. While the degree of overlap between the various definitions and functional uses of the terms 'e-business' and 'e-commerce' is high, the term 'e-commerce' is often associated with processes that involve online transactions, as the following OECD definition of e-commerce demonstrates:

'The sale or purchase of goods or services, whether between businesses, households, individuals, governments, and other public and private organizations, conducted over the Internet. The goods and services are ordered over those networks, but the payment and the ultimate delivery of the good or service may be conducted on or off-line.' (OECD 2002)

Note that this definition has a focus on the conduct of transactions, and explicitly includes the three areas of business to consumer (B2C), business to business (B2B) and business to government (B2G).

Both terms, e-business and e-commerce, are not always limited to Internet processes as the following definitions illustrate, with the first definition simply referring to 'digitised data' while the second definition leaves the technology scope unspecified, although it does include a reference to the Internet:

'Electronic commerce generally refers to all forms of transactions relating to commercial activities involving both organizations and individuals, that are based upon the processing and transmission of digitised data, including text, sound and visual images.' (Parker & Papandrea 2002)

'As a way of doing business, e-business refers to the use of business processes that leverage technology – and especially the Internet and

World Wide Web (the Web) – to maintain or create competitive advantage’ (McKie 2001).

For the purpose of this research, the term e-business will be used and will be treated as interchangeable with the term e-commerce. Also for the purpose of this research the technology scope of e-business activities is limited to the Internet. Use of the Internet includes network variations using restricted access via login procedures such as intranets and extranets, as the following definition illustrates:

‘E-business can be defined as publishing information and performing different types of transactions, or chains of them, electronically over Intranets, Extranets, and the Internet. This may be within organisations, or between them, and with the involvement of individual customers’ (Bakry & Bakry 2001).

Another interesting characteristic often linked with e-business is the association with the concept of providing competitive advantage. The McKie (2001) definition given above draws an explicit and close connection between e-business and competitive advantage, while the following definition implicitly includes the idea:

‘The use of electronic networks and associated technologies to enable, improve, enhance, transform or invent a business process or business system to create superior value for current or potential customers’ (Sawhney & Zabin 2001).

The coupling of e-business with the delivery of some level of guaranteed benefit is one which appears regularly in the literature. However the relationship between e-business and delivered benefit should not be assumed to be consistent for all process domains (see section 1.5.2), or perhaps to even exist in some areas. The reason for this note of caution against the presumption of e-business necessarily resulting in competitive advantage relates to the multi-dimensional nature of Internet-enabled e-business, discussed next.

Internet-enabled e-business is not a discrete entity but is rather a collection of internet-based technologies utilising global network connections which together have the potential to support a very wide range of business processes (Wu, Mahajan & Balasubramanian 2003). The following definition of e-business illustrates the wide range of purposes that can be associated with e-business:

'the use of Internet technologies to link customers, suppliers, business partners, and employees using at least one of the following: (a) e-commerce websites that offer sales transactions, (b) customer-service web-sites, (c) intranets and enterprise information portals, (d) extranets and supply chains, and (e) IP electronic data interchange' (Wu, Mahajan & Balasubramanian 2003).

Because of the wide variety of purposes, and the different levels (eg shallow or deep) at which the processes can be used, adoption of e-business cannot be described in simple terms such as 'yes' or 'no', but rather in terms of degrees of adoption and implementation along continuums in a variety of 'process domains' (Wu, Mahajan & Balasubramanian 2003). Process domains are defined next in section 1.5.2. The adoption and integration of e-business technologies with existing business processes (either as additional or replacement processes) has been described as a 'journey' (Sawhney & Zabin 2001), which is an effective metaphor for the many and continuous steps involved. It is also useful to think of the journey as one that is without an end, and which can take many paths for different purposes.

In conclusion, for the purpose of this research, the term 'e-business' will be defined in a broad sense to refer to all business processes that use the Internet. No presumption is made concerning the delivery of guaranteed benefit or competitive advantage as either the motivating force or outcome of e-business adoption.

1.5.2 Process domains

The term 'process domains' is used to signify the grouping of processes into sets based upon some common element that characterise each group or domain. Grouping can occur in a number of ways. For example, one way to group business processes is by the purpose of the process. Using this approach, Zwass (2003) for example identified the five broad domains of commerce, collaboration, communication, connection, and computation. Another way that business processes might be grouped is by the particular technology type that is used – for example, processes supported by e-mail, or by the use of web-sites. The different grouping options each have their own advantages and disadvantages, but all provide a useful framework for detailed exploration of the different components of e-business, and the set of influencing factors which apply to each group.

For the purpose of this research e-business is divided into separate process domains based upon a combination of technology type, ownership and users. This grouping is selected because it provides an easily identifiable technology framework for grouping business activities in terms of ownership and audience/purpose. Specifically the major process domains identified for this research into e-business use by wineries are: use of e-mail, use of web sites operated by groups external to the wineries (external web sites), and three possible types of web sites operated by each winery – 1) their own web site designed for access by the general public (public web sites); 2) their own web site designed for access by relevant business groups (extranets); and 3) their own web site designed for access by the winery's own staff (intranets).

1.5.3 Adoption, diffusion, assimilation and implementation

Investigations into the uptake of innovations, including IT innovations, focus on various stages of the uptake process. Various labels are used to describe the different stages. Care is needed to ensure that the terminology describing the different stages is used consistently, that terms are not applied out of context, and that studies looking at different stages of the uptake process are not incorrectly compared. The major stages discussed in the research literature are adoption, implementation, diffusion and assimilation, and these terms are now defined in order to distinguish between them. Figure 1-3 illustrates the various stages of the adoption and diffusion process of information technology innovations, with the dotted line indicating that the process is likely to be circular in nature in the case of e-business uptake, due to the many and varied forms it can take.

The term '**adoption**' refers to the initial decision to take on the innovation in question, which is defined by Rogers (1995, p. 21) as '*a decision to make full use of an innovation as the best course of action available*'. The innovation-decision process is acknowledged to be more complicated when taken by an organisation rather than an individual due to the increased number of people and related issues involved (Rogers 1995). While it is not clear that adoption necessarily requires *full use* of an innovation or has to be the *best* course of action, the definition is useful in suggesting that adoption decisions are usually made with these aims in mind. Part of the adoption decision requires consideration of how the later stages of implementation and assimilation might occur in practice. Studies into the adoption

stage focus on identifying the factors that act as facilitators, drivers or barriers to the adoption opportunity.

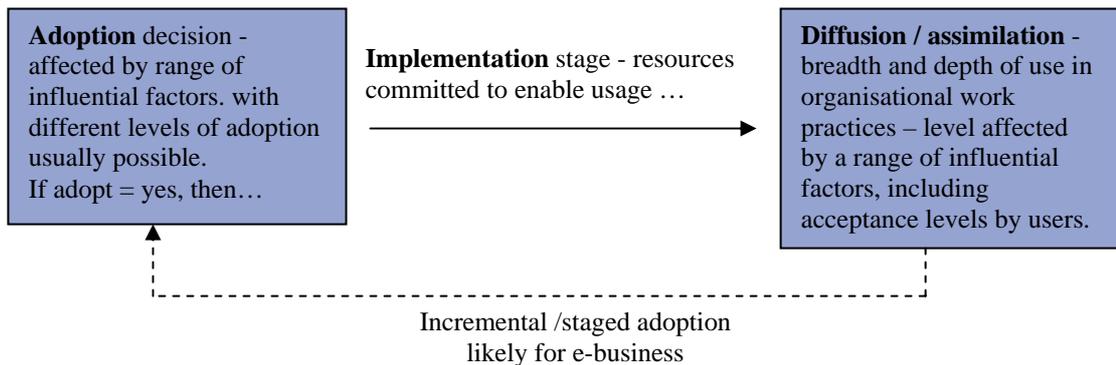


Figure 1-3 Stages involved in the uptake of IT innovations by organisations

Source: developed for this research

The term ‘**implementation**’ refers to the activities an organisation undertakes in order to be able to make use of the innovation that has been adopted, and usually this will involve the commitment of a range of financial, human and infrastructure resources (new and/or existing) (Cooper & Zmud 1990). In the case of the uptake of information technology innovations, the resource implications are usually high, with software, hardware, the fate of legacy systems and new training costs all needing to be taken into consideration. A useful definition from the perspective of technological diffusion reads:

‘IT implementation is defined as the organizational effort directed toward diffusing appropriate information technology within a user community’.
(Cooper & Zmud 1990)

The term ‘**diffusion**’ is the process ‘*by which an innovation is communicated through certain channels over time among the members of the social systems*’ (Rogers 1995) and thus refers to breadth and depth of use within a community of organisations and/or individuals. The term ‘**assimilation**’ is similar, and refers to how widely and how much the innovation is used *after* it is adopted and implemented. The following quotation, referring to IT innovations in particular, illustrates:

‘Assimilation may be divided into two sub-constructs: breadth and depth of technology use. Breadth of use refers to the number of adopters within a firm (also labelled internal diffusion), while depth of use is a less

tangible construct describing how extensively the innovation is used and its level of impact within the firm.’ (Gallivan 2001)

The set of factors influencing patterns of diffusion and assimilation are: likely to come from internal characteristics of the adopting organization (Chatterjee, Grewal & Sambamurthy 2002); be influenced by user acceptance issues (Davis 1989); and are not likely to be exactly the same set of factors which influenced the initial adoption decision.

The major focus of this research into e-business use by Australian wineries is on the adoption stage, with the empirical data on usage behaviour gathered in both the pilot study and main survey acting as the major source of evidence for the nature and extent of adoption. The research does not investigate implementation issues or acceptance levels by users.

1.6 Delimitations of scope

E-business has been defined in section 1.5.1 as restricted to business processes that occur over the Internet. It is possible to use a wider definition than this, but this restriction introduces a practical scope for the purpose of this research.

Given that this investigation has a broad focus but must also be constrained in scope and extent due to usual time and cost constraints of academic research, the study is limited to investigating the activities of one particular group (wine companies) in one specific industry (wine industry). This narrowing of the scope allows for greater depth and detail to be included and for a wider range of issues and possible influencing factors to be explored than would be possible if there was not a unitary industrial context. However, it also reduces the generalisability of the findings to other industries and other contexts.

1.7 Outline of the report

In this first chapter, the framework and context of the research project is presented, along with justification and explanation of the research question and discussion of terms and delimitations of scope. The research methodology is also outlined.

In the second chapter, relevant literature is reviewed for work on identification of factors which influence adoption of innovations in general, before the scope is narrowed down to research on adoption of complex information technologies similar in nature to e-business. Prior research into the adoption of e-business is then

examined in more detail to investigate which factors have particular significance, followed by a review of literature specifically investigating adoption of e-business by Australian wineries.

The approach and conduct of both research methods employed are described in chapter three: the pilot study interviews and the survey using a self-administered mail questionnaire. It is demonstrated that care was taken to maximise the reliability and validity of the survey instrument during the development stages. The instrument was not closely based on a pre-existing instrument developed for other research, but rather developed specifically for this study to maximise relevance to Australian wineries and current issues and conditions.

Findings from the pilot study interviews are summarised in chapter four. A preliminary assessment of the findings have also been published in refereed conference proceedings (Roberts & Fitzgerald 2003). The factors influencing the described e-business behaviour, as well as the behaviour itself, appear to be associated with winery size and market focus. Influence from the actions of supply chain organisations and also from government emerged as factors influencing some of the e-business behaviour described by interview respondents, as well as the perception of benefits and the winery's capacity to adopt in terms of both human and technological resources. Other possible influential factors which have been highlighted in literature such as the knowledge burden and influence from owner characteristics were not particularly emphasised during the interviews. Findings from the pilot study therefore determined the set of e-business process domains to be included and the four factors selected for further study in the survey stage. Given that the influence of relative advantage and resource capacity are already clearly established in the literature, no propositions were developed to test their importance as factors. Instead, propositions were developed to test whether 1) the nature and extent of e-business activity differs significantly by winery size; 2) influential factors have variable levels of impact in different e-business process domains; and whether the nature and extent of e-business adoption is influenced 3) by the activities and perceived reactions of other organisations in the wineries' supply chain; and 4) by provision of government online services and compliance processes.

Chapter five reports on the data analysis of the survey results, and includes testing of the four propositions. The analysis is based on a modified categorisation of winery sizes which separates out the very large organisations from the others. The very large

size category has not been used in prior research into e-business adoption by Australian wineries, and thus the findings related to the very large group provide a useful contribution to the winery industry. The analysis confirmed that the nature and extent of e-business activity does vary significantly by winery size and that factors do impact in different ways in different e-business process domains. Quantitative support was also found to show that the supply chain and government factors also influence some of the e-business behaviour of Australian wineries.

The final chapter provides the summary and conclusions of this research. The nature and extent of e-business adoption by wineries, as well as being described in detail, is shown to be complex in nature with usage trends associated clearly with winery size and market position. The influence of powerful business customers on the behaviour of the large and very large wineries is confirmed as an important factor affecting winery B2C web sites in particular. Activities of the government are shown to influence the use of external web sites for information gathering and online compliance, with impact increasing along with winery size. Implications for theory development are also discussed, along with limitations and suggestions for future research.

1.8 Summary

This chapter has presented the background of this study into e-business adoption, provided justification for the research, and given reasons for the selection of Australian wineries as a suitable industry sector for this research. The specific research question has been presented, along with an outline of the report and a discussion of key terms to provide context for how these terms are used for the purpose of this research. The report proceeds next to the review of relevant literature.

2 Literature review

Chapter One gave an overview of the general research problem area and specific research problem under investigation. The main literature areas of interest to this research are summarised in Figure 2-1 and 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. Prior studies into the adoption of e-business by Australian wineries are of particular relevance to this work and are also included. Also, a brief background on the Australian wine industry is provided in Appendix A.

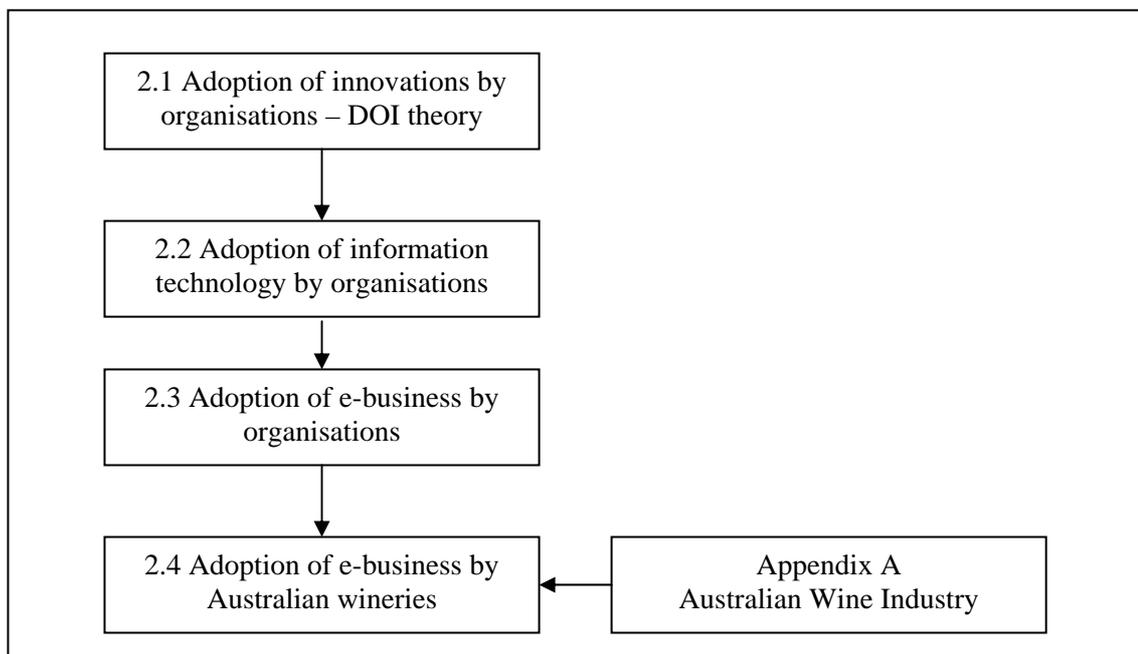


Figure 2-1 Major areas of literature under review

The focus on adoption in this research is on the drivers and barriers that influence *organisational* adoption decisions and subsequent implementation behaviour within the organisation. Behaviour of the organisation as opposed to behaviour of individuals within the organisation is thus the primary area of interest. Studies and related theoretical frameworks covering the adoption, acceptance and diffusion of innovations by individuals as opposed to organisations have reduced relevance to this study because of the very different nature of the unit of analysis (Gallivan 2001; 1995, p. 216).

2.1 Adoption of innovations by organisations

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). While DOI theory is applied to adoption by individuals, it is also often applied to organisational contexts, and for this reason is of interest and relevance in this study.

2.1.1 Diffusion of Innovation Theory

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. Figure 2-2 shows the list of factors, some of which act positively (+) and some negatively (-), as identified in DOI theory (Rogers 1995). The influence of managerial championship and opinion leaders acting as agents of change is recognised as an accelerating force affecting the potential adopters. The DOI theory also observes that the percentage of adoption as a function over time follows an S-curve and includes the concept that a critical mass of about 10-25% adoption is required for the innovation to “take off”.

Innovation Characteristics	Organisation characteristics
1) perception of relative advantage over alternatives; (+)	1) Attitude towards change of individual leader (+)
2) perception of compatibility with existing values, experiences and needs; (+)	2) Internal characteristics of organisation's structure
3) perception of complexity; (-)	Centralization (-), Interconnectedness (+)
4) the degree to which the innovation can be tried on a limited and experimental basis; (+)	Complexity (+), Organisational slack (+)
5) the degree to which the results of the innovation can be observed. (+)	Formalization (-), Size (+)
	3) System openness – the degree to which members of the system are linked to others external to the system (+)

Figure 2-2 Innovation characteristics and organisation characteristics identified as influencing innovation adoption and diffusion (Rogers 1995)

As can be observed from Figure 2-2, five characteristics of an innovation 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 identified in the 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). As listed in Figure 2-2, 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 (Rogers 1995). The boundaries between some factors are recognised 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).

The innovation and organisation factors identified in DOI theory have proven to be broadly applicable to a wide range of innovations. The degree of relative advantage an innovation delivers, and the resource capacity/size of the adopting organisation emerge as two of the most important of the identified factors. Before information technology and e-business adoption is covered specifically, consideration of different innovation types is briefly presented.

2.1.2 Innovation types: incremental to radical

Classifying innovations into major types is recognised as important for innovation adoption and diffusion studies because the likelihood that one theory can cover all innovations in all situations is unrealistic (Dewar & Dutton 1986). Dewar and Dutton (1986), based on work by Ettlie (1983), proposed that a useful distinction between innovations could be made with regard to the level of associated radicalness, where a 'radical' innovation requires a high level of knowledge and represents a revolutionary change from existing practice, while an 'incremental' innovation has a

low knowledge requirement and represents a minor improvement or simple adjustment only. While the two categories of 'radical' and 'incremental' innovations proposed by Dewar and Dutton are likely to represent different ends on a continuum rather than only two possible innovation types, the distinction between the two extremes is useful in highlighting major qualitative differences that in turn affect the range of factors influencing adoption and diffusion behaviours. The notion of radicalness - connected with both knowledge requirements and the extent of innovation impact - is also relevant for information technology innovations, which are explored next.

2.2 Adoption of information technology by organisations

Having recognised that innovations vary with regard to their radicalness, and that these differences affect the range of influential factors on innovative behaviour, information technology innovations are now considered in more detail. Information technologies vary from one another in terms of their complexity, the financial and infrastructure demands they place upon an organisation and the knowledge and skills they require to be successfully implemented and infused into existing business processes (Swanson 1994; Wu, Mahajan & Balasubramanian 2003). For this reason, two typologies for categorising different types of information technologies are discussed next in section 2.2.1, and the placement of e-business within these typologies is considered. This is followed by a discussion on factors identified as influencing adoption of information technologies in section 2.2.2.

2.2.1 Classifying information technologies

The following two information technology classification systems illustrate the differences between the extent and nature of impact that various information technologies have on the operations of an organisation. Fichman (1992) proposed a simple typology consisting of only two types which uses knowledge requirements and user interdependencies as the two criteria for categorisation. Type 1 technologies are characterised by having a low knowledge requirement *and* a low dependence on use of the same technology by others, for example use of PC's and desktop office software; while Type 2 technologies have either high knowledge barriers, for example CAD systems, *or* require significant user interdependencies, for example e-mail, *or* both, for example MRP systems (Fichman 1992).

Swanson (1994) developed a typology which uses the level or scope of business impact as the major criterion for categorisation. Three major divisions or types are identified: Type I innovations are classified as the simplest with their impact largely restricted to the core information systems area of the organisation; Type II innovations support business-wide administration; and Type III innovations are those that potentially affect the whole business in strategic terms by providing competitive advantage, with adoption occurring at the organisation level because of the consequent impact on strategies and business processes. Also Type III innovations are likely to affect the core business technology and administrative procedures through the need for integration (Swanson 1994).

The position of e-business within these classification systems is now considered in order to identify the most relevant literature for this research: prior research into information technologies similar in nature to e-business have greater relevance to this research than information technologies that have little in common with e-business. In Fichman's simple two-type system, e-business is Type 2 because high levels of user interdependencies are required for most e-business processes to be effective since it is a network technology. It is also likely that, for some adopters, the knowledge requirements will be considered high – see section 2.3.1 for further discussion on knowledge related issues. Using Swanson's three-type classification system, e-business is classified as a Type III information technology because of 1) the global reach and additional networking capabilities of Internet technologies; 2) the wide range of different business processes that can utilise the Internet; and 3) the high level of strategic impact associated with e-business (Chatterjee, Grewal & Sambamurthy 2002).

Thus, e-business is characterised as an information technology with high user interdependencies; the potential to transform strategy and processes (Chau & Turner 2001), and the potential to deliver organisation-wide business impact. Some authors also assume that e-business is radical in nature (Lee 2001; Srinivasan, Lilien & Rangaswamy 2002), as the following quotation from Srinivasan, Lilien & Rangaswamy (2002, p. 47) demonstrates:

For example, consider e-business, a radical technology that has been transforming business models and processes, resulting in the disruption of old industries and the creation of new ones.

However, because e-business can be adopted in a number of incremental stages at different levels and for different purposes by different organisations (Wu, Mahajan & Balasubramanian 2003), it is possible that, in practice, e-business is not always adopted in a radical manner or adopted for radical purposes.

Prior research into complex information technologies with high user interdependencies and the potential to transform organisation-wide strategy and processes has greater relevance to this research than other types of information technologies because these are essential characteristics of e-business. Research into this area is examined next.

2.2.2 Factors influencing adoption

Three of the most important factors recognised as having significant influence on information technology innovation by organisations are 1) a high perception of beneficial outcomes increasing the motivation to adopt; 2) access to the necessary resources required to adopt, implement and use the innovation; and 3) and managerial support (Fichman 2001). Case study research into information technology adoption by SME's in Portugal by Calderia and Ward (2002) supports these findings. Measuring the level of benefits delivered by information technology adoption is, however, acknowledged to be difficult in practice (Sethi & King 1994). All three constructs identified above are identified under one label or another in the DOI theory discussed in section 2.1.1, and also appear regularly in other related contexts such as technology acceptance, discussed briefly next.

The Technology Acceptance Model (TAM), a framework developed to explain the acceptance of information technology by individuals after the adoption and implementation stages have occurred, originally included only two constructs – 1) perceived usefulness and 2) the perceived ease of use (Davis 1989). Of these two constructs, Davis concluded that usefulness was the more significant of the two constructs. An extension of TAM by Mathieson, Peacock and Chin (2001) introduced a third construct of perceived resources (for example: time, money, skills). The associated study concluded that the perception of available resources affects use of information technologies, and therefore needs to be taken into account. A recent version of the user acceptance model, the Unified Theory of Acceptance and Use of Technology (UTAUT) renamed 'usefulness' as 'performance expectancy', 'ease of use' as 'effort expectancy', and introduced additional broad

brush constructs such as ‘social influence’ encompassing managerial championship and ‘facilitating conditions’ encompassing resource capacity and organisational conditions (Venkatesh et al. 2003).

Thus, highly similar factors appear under various labels in several models and theories covering innovation adoption and use. Also the set of factors identified in TAM variants and UTAUT correspond closely with factors identified in DOI theory. Moore and Benbasat (1991), while developing an instrument based on DOI factors to measure an individual’s perceptions of adopting an information technology innovation recognised the similarity between the construct of perceived usefulness with perceived relative advantage, and between perceived ease of use with perceived complexity. Karahanna, Straub and Chervany (1999), similarly, used multiple labels for several factors when they compared beliefs and attitudes before and after the adoption of information technologies. They found that while many factors potentially influence pre-adoption beliefs, the main factor affecting attitudes post-adoption relate to the perception of benefits delivered (Karahanna, Straub & Chervaney 1999).

A review of empirical research into the adoption and diffusion of information technology by Fichman (1992) observed that information technology adoption differs from many other innovation types due to a number of complicating factors. For example, adoption tends to occur on *different levels* rather than as a simple yes/no case (Bayer & Melone 1989; Wu, Mahajan & Balasubramanian 2003), making comparison between adopters more difficult. Also, adoption can depend on the community-wide level of adoption and whether or not sufficient critical mass has been established due to *network externalities* (Katz 1986), discussed next.

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). For example, the utility of fax machines as a communication mechanism depends on the number of others with fax machines. Adoption decisions are delayed until there are sufficient numbers of other users to justify the adoption in the first place. As the number of users reaches critical mass the market growth curve can rapidly increase to the point where the market is able to build itself, and demand-side economies of scale are achieved. This market growth tends to follow the S-shaped

pattern observed in Rogers' DOI theory (Rogers 1995), with a slow start followed by explosive growth and finally reaching a saturated market (Shapiro & Varian 1999).

As well as network externalities, many other external environmental factors have been identified as having influence on the adoption and diffusion of complex information technologies. Environmental factors come from a wide range of sources and, for example, include characteristics related to industry, marketplace, culture, and regulatory conditions (Kwon & Zmud 1987; Swanson 1994; Yang et al. 2004). These 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).

Studies into the adoption of complex information technologies illustrate the multitude of factors identified. For example, research into the initiation and adoption of client-server technology in organisations (Chengalur-Smith & Duchessi 1999) identified three major sources of influence: 1) characteristics of the organisation itself, such as size, structure, and culture, including the selected migration strategy for the adoption of the technology; 2) characteristics of the technology itself, such as the complexity, scope and cost of the system being adopted; and 3) characteristics of the external environment, such as government regulation, the level of competition faced by the organisation, and the organisation's market position. Factors from all three areas were found to have a significant effect on the adoption process (Chengalur-Smith & Duchessi 1999).

As a second example, many factors from a range of sources were also identified as influencing diffusion of mobile broadband services in Korea (Yang et al. 2004). External environment features figure prominently, while software and telecommunication standards, the industry and government regulatory regime, market place forces, and internal skills and resources all contribute to usage levels. Complex relationships and interactions occur between all influential factors, resulting in outcomes that are characterised by continual evolution and change (Yang et al. 2004).

Of the many factors identified as influencing information technology adoption, the knowledge and skill requirements associated with the technology are cited as a major potential barrier (Attewell 1992). Firms delay adoption until they obtain sufficient

know-how to implement and use it effectively (Attewell 1992). Those firms with adequate capacity to adopt such as prior related knowledge and sufficient diversity of technical skills, as well as a greater scale of activities over which the learning costs can be spread, are more likely to adopt complex technologies than firms lacking these characteristics (Fichman & Kemerer 1997). However, when knowledge barriers are sufficiently high to warrant the involvement of specialists, service providers increasingly emerge to fill the knowledge gap. This in turn makes it easier for firms to adopt, as the knowledge burden is lowered without the need for extensive in-house expertise (Attewell 1992).

In conclusion, factors influencing the adoption and diffusion of complex information technologies include those identified for innovations in general, but also include a wide range of environmental characteristics, and are likely to be influenced by the number of other adopters due to network externalities. The degree of perceived resource capacity enabling adoption and perceived relative advantage as a result of adoption remain central in explaining innovative behaviours across all situations. A greater emphasis on examining the actual usage of information technologies however, is identified as beneficial in further diffusion research (Chin & Marcolin 2001).

2.3 Adoption of e-business by organisations

The nature of e-business is considered first in section 2.3.1, followed by an examination of influential factors identified in studies into the adoption of e-business by organisations in section 2.3.2. Research studies funded by the Australian Government are summarised in section 2.3.4. These studies are covered separately due to their express and explicit vested interest of promoting and championing adoption of e-business practices for the benefit of the Australian economy.

2.3.1 The nature of e-business

The importance of the characteristics of e-business as a key source of influential factors on adoption and diffusion behaviours is clearly established in DOI theory. These characteristics are explored next.

First, e-business is closely associated with economic growth at both a national and organisational level in the minds of many, including economic and government

analysts (Bakry 2001; Brown 2002; Dunt & Harper 2002; Porter 2001). Internet-enabled e-business is accredited with delivering a new type of economy in which information flows are improved while associated costs are reduced (Dunt & Harper 2002). Thus, the Australian government in particular actively champions adoption by Australian businesses in order to accelerate uptake and consequently improve the Australian economy (Brown 2002; NOIE 2002; Parker & Papandrea 2002)

Second, e-business requires specific knowledge and skills (Nambisan & Wang 2000). Even the simplest form of e-business adoption requires some Internet-related knowledge in order to set up the necessary hardware and software. Lack of relevant knowledge within an organisation has been identified as a significant barrier to web technology adoption, particularly as the complexity of the e-business task increases (Chatterjee, Grewal & Sambamurthy 2002; Nambisan & Wang 2000). However, it is possible that the presence of many Internet service providers and web developers in Australia reduces the knowledge barrier by providing organisations with plentiful outsourcing options. No research on this specific topic was found.

Third, adoption decisions are complicated by security and trust issues that are directly related to the nature of the Internet. Building trust and confidence involves addressing consumer concerns, and the legal and financial risks unique to the use of web technology (NOIE 2000; Schoder & Yin 2000). For consumers, privacy and security concerns are major barriers to buying online, negatively impacting on the future growth of online markets (Hoffman & Novak 2000; Miyazaki & Fernandez 2001). Addressing trust and risk issues are major, complex tasks in the development of e-business strategy (Hoffman, Novak & Peralta 1999; Urban, Sultan & Qualls 2000). Organisations need to consider: the implications of increasing their reliance on digital assets and an increased vulnerability to cyber crime and fraud; accepting some loss of control of infrastructure and business processes as more stakeholders become involved; having a mechanism for reliably assessing different risks; and integration with existing systems (Czuchry, Yasin & Bayes 2001; Jones et al. 2000; Kandra 2001; Radding 1999).

Fourth, many e-business processes are subject to network externalities, because their effectiveness depend on the number of corresponding users (Sammut-Bonnici & McGee 2002). For example, the effectiveness and utility of e-mail increases as the

number of people within a network also use e-mail for communication and exchange of electronic information, and similarly for web sites.

Fifth, changes in supply chains generally, as a result of information technology network effects, are potentially far-reaching and pervasive, with an increasing shift to cooperative rather than competitive behaviours between organisations. The balance of power can shift substantially because of altered relationships through networked complementarities increasingly replacing traditional competitive hierarchies. Strategic alliances are also more likely to be a mechanism by which firms can cope with additional costs (Sammut-Bonnici & McGee 2002).

2.3.2 Additional factors influencing e-business adoption

Several studies report on research into the adoption of e-business by organisations, and the level of business impact delivered as a result. The literature is now reviewed for additional factors or factors that have increased relevance to e-business adoption compared with other complex information technologies. Discussion is divided into two main categories: 1) External environment factors, including supply chain related influences; and 2) Internal business and technology factors. The factors previously identified in DOI theory, listed in Figure 2-2, are found to still apply to e-business adoption (Chong 2000), and discussion on these is not repeated due to making no significant new contribution.

External environment factors

A wide range of external factors appear to have major importance in influencing the adoption and diffusion of e-business. 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). Some of the factors identified as 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 both e-banking and e-government (Palacios 2003).

The role of government in providing adequate support and acceptable legal and regulatory frameworks is recognised as extremely important (Gibbs, Kraemer &

Dedrick 2003; Palacios 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).

While the actions of others in the supply chain have been previously identified in section 2.2.2 as having some influence on complex technology adoption due to network externality forces, the impact of this factor appears to be greatly magnified with respect to e-business. 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). This finding supports the notion that network externalities apply to some e-business processes, with the number of supply chain organisations influencing adoption and diffusion levels. As the benefits rise with increasing numbers, so too do the normative pressures for other supply chain organisations to adopt, and hence normative pressure is also identified as an influential factor (Wu, Mahajan & Balasubramanian 2003).

Influence from the competitive marketplace environment is acknowledged as important. In particular, 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).

Competitive pressure from other companies has been found to have the most influential impact of e-business adoption in Taiwan, particularly in the manufacturing sector (Chen 2003). A cross-country study, involving ten countries, into 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.

A ten year case study into the move from EDI to e-business in BHP Steel, one of Australia's largest companies, found that the main driver changed from an initial push to improve business efficiency and reduce costs, to improving the involvement of suppliers and customers in network relationships (Chan & Swatman 2000). BHP found that for e-business to be successful they needed to involve their suppliers and customers in the process, and in doing so the relationships in their supply chain became more cooperative as a result (Chan & Swatman 2000).

Internal business and technology factors

In addition to the organisation characteristics identified in DOI theory, an organisation's orientation towards customers and towards competitors has also been identified as a factor influencing e-business adoption (Wu, Mahajan & Balasubramanian 2003). Those organisations with a high customer orientation which seek to frequently exchange information with their customers and facilitate efficient and convenient customer transactions in order to provide a better service are found to be more likely to adopt e-business processes to support communication and online transactions (Wu, Mahajan & Balasubramanian 2003).

Organisation size, identified previously as an influential factor in DOI theory, has been further investigated with regard to e-business. A direct comparison of the rationale for adopting e-business and the benefits subsequently delivered between small and large organisations was undertaken by Daniel and Grimshaw (2002) in order to investigate the effect of organisation size on e-business adoption. Employee numbers were used to distinguish organisation size into two categories, with small defined as 250 employees or less and large organisations as having more than 250 employees. The firms were distributed nationally across the UK and covered a range of unspecified industries. The main findings of the UK study were that e-business adoption in small organisations was influenced more by competitor behaviour, the desire to provide enhanced customer service, and improving relationships with

suppliers than large organisations, while large organisations were influenced more by the prospect of operational efficiency than small organisations. Also, small organisations perceived they had greater benefits from their e-business adoption than the larger organisations in all the areas covered by the research study (Daniel & Grimshaw 2002).

In addition to the knowledge barriers discussed in sections 2.2.2 and 2.3.1, other technology-related factors of high software costs and problems with the lack of integration with existing systems have been identified as barriers to e-business adoption (Chong 2000; Iacovou, Benbasat & Dexter 1995; van Akkeren & Cavaye 1999).

2.3.3 Conceptual model for e-business adoption

A conceptual framework of the antecedents and performance outcomes of e-business adoption, developed by Wu, Mahajan and Balasubramanian (2003), is presented in Figure 2-3. This framework brings together many of the influential factors of greatest relevance identified in previous literature, and breaks e-business into separate process domains related to their business purpose: communications, internal administration, order taking, and procurement. The model shows the importance and recognition of external environment factors commonly acknowledged in the literature as influencing e-business adoption and outcomes such as customer power, and which are missing from the general DOI framework developed for innovations in general, discussed in section 2.1.1. The organisation characteristics include customer orientation, referring to the organisation's ability to understand customer needs, and focus efforts to satisfy those needs in order to provide superior service. The model also treats organisation size, measured by employee numbers, as a control variable for the greater scalability larger businesses can derive from e-business adoption, with scalability defined as *'the ability to increase output without corresponding increases in the variable costs of achieving that output'* (Wu, Mahajan & Balasubramanian 2003, p. 434).

This conceptual model reflects the complexity of the situation, and illustrates that not only do a wide range of factors need to be taken into account, but that some of the factors act as moderating variables, such as the environmental uncertainty factors identified in Figure 2-3, while others act as independent variables influencing the nature and extent of adoption.

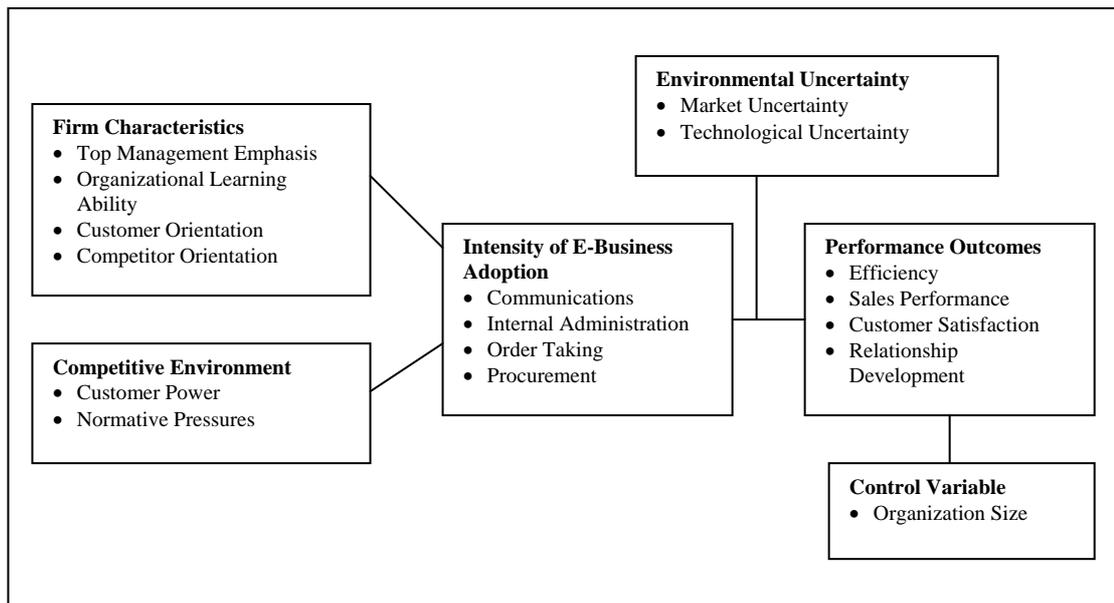


Figure 2-3 Antecedents and performance outcomes of e-business adoption: a conceptual model (Wu, Mahajan & Balasubramanian 2003, p. 429)

2.3.4 Australian Government studies

The Australian Government acts as a strong champion for e-business adoption by Australian organisations. The National Office for the Information Economy (NOIE) was, for many years, one of the main Australian government organisations promoting e-business adoption within Australia. In April 2004 NOIE was restructured and renamed, with the functions split between the new Australian Government Information Management Office (AGIMO), and the Office for the Information Economy (OIE). The research and strategic role setting function of NOIE has been taken on by OIE. Major objectives of OIE include *‘identifying and promoting the business case for the adoption of e-business at the firm level, within supply chains and throughout industry sectors’* and *‘to accelerate the uptake of electronic-business tools and practices that will lift the productivity and productive capacity of the Australian economy’* (OIE 2004).

The favoured methodology of data collection in NOIE reports is that of case studies (NOIE 2001, 2002, 2003b), and the major focus is on increasing e-business adoption by small and medium size organisations. The reports have a heavy emphasis on highlighting benefits and favourable economic implications of adoption (NOIE

2002). Identified barriers include: lack of knowledge about e-business in general; problems with finding skilled web site developers; costs associated with web site development and maintenance; and the lack of corresponding use by other supply chain organisations such as suppliers and customers (NOIE 2001, pp 2-5).

Case studies with a supply chain focus have been conducted. For example, the e-business processes adopted by Berri Limited to improve their supply chain operations revealed that the major motivating factors for adoption included pressures to meet the requirements of their major retail customers in a competitive environment that is becoming increasingly globalised (OIE 2003). Before new supply chain processes were adopted with trading partners however, the company upgraded internal systems to ensure a 'solid foundation', and considers this an important success factor in being able to evolve the e-business systems (OIE 2003). Adoption and implementation of additional e-business processes has occurred in an incremental stages, and this approach is also viewed by the company as a key factor to success (OIE 2003).

Other government funded studies have also found that lack of knowledge is a barrier, with e-business technologies seen to be too complex for adoption by ASMEs (Brown 2002). In response to this finding, the provision of online government services or G2B is viewed as an essential component in encouraging demand for e-business use (NOIE 2003a). As well as increasing demand by providing more online services, the government has taken on a pro-active leadership role, providing both incentives and training in order to facilitate adoption by ASMEs (Brown 2002; NOIE 2002). Identified barriers include lack of adequate bandwidth speeds, lack of packaged software solutions, security concerns, and lack of enforceable standards for Internet Service Providers (Brown 2002).

2.4 Adoption of e-business by Australian wineries

Studies which specifically investigate the adoption of e-business processes by wineries and Australian wineries in particular, are now reviewed.

2.4.1 Winery use of e-business in general

Research on Australian wineries' use of e-business in general rather than the use of B2C web sites specifically appears to be very limited. The 'Australian and New

Zealand Wine Industry Journal', for example, has published just a handful of articles connected with e-business over the last five years. One of these articles was an examination of e-business opportunities for wine producers by Michael Major (2000), Manager of WineBiz, a company specialising in developing web sites for wine industry organisations. Major predicted that: pressure to adopt would come from both business partners and customers in their requirement for online transactions, communication and documentation; and adoption of e-business processes by wineries would occur in a number of evolutionary steps rather than by radical and revolutionary transformation (Major 2000). Major also provided a critique of the uses and benefits of different e-business process domains by technology type, reviewed next.

E-mail was judged as one of the most important e-business processes for wineries, producing cost savings, improving communication levels, efficiency and immediacy, and leaving a permanent record (Major 2000). The use of external web sites by wineries for such things as monitoring competitors and consumer trends, travel bookings, processing banking, tax returns, and wine export approvals online was also recommended as part of winery e-business activity, producing efficiency and information benefits (Major 2000). A winery B2C web site was viewed as an essential business tool which required high levels of maintenance and monitoring in order to be effective. The adoption of extranets and online image banks for access by media and business partners was also recognised as beneficial for wineries, producing cost savings and improving quality of media coverage (Major 2000).

The Rural Industries Research and Development Corporation (RIRDC) included a case study of a winery, Reynolds Winery, along with 21 other case studies of rural organisations selected as examples of successful e-business adopters, and which collectively show a range of e-business processes being used in practice (Papandrea & Wade 2000). Each case study organisation was presented as an 'agent of change' with the purpose of promoting further adoption by others. At the time of the case study, Reynolds Winery, described as a medium sized winery with the bulk of their wine sold to large domestic and export customers, employed eight full-time and 10 part-time staff, and had a turnover of \$1.2 million annually. E-business processes at Reynolds Winery included e-mail - considered to be a very important communication

tool - and a web site that was included as an integral part of the company's marketing plan. No online procurement occurred as no suppliers offered this functionality.

The web site was used primarily for promoting product awareness, particularly for overseas markets. The site also included online sales options. Online sales were low and treated as a bonus. However, considerable difficulties were experienced with fulfilling online sales, including theft, breakage, and very high freight costs. The site also included controlled access to marketing images and information for distributors around the world, thus incorporating B2B extranet functionality. The main difficulties with the web site included the maintenance overhead of keeping the information current, finding a satisfactory Internet Service Provider, and lack of technical knowledge within the company to manage the maintenance tasks. Despite these problems, the owners of Reynolds Winery felt positive about the benefits of e-business, which included reduced communication costs and improved market opportunities (Papandrea & Wade 2000). Postscript to the case study: Reynolds Winery listed on the Australian Stock Exchange in 1999, and became the largest wine producer in the Orange region in New South Wales, with plans to increase production from 10 000 tonnes in 2002 to 20 000 tonnes by 2006. Unfortunately however, Reynolds Winery stopped trading and went into receivership in August 2003. No information on the major causes of the company's problems has been found, and therefore no explanation for the company's demise can be provided. Company announcement information is available from the Australia Stock Exchange web site, using the RYW company code (ASX 2004).

An Australian Government commissioned report, published in 2002, into pathways to profitability for small and medium wineries makes almost no mention of how the Internet may be used by wineries, and the use of e-business processes do not appear as one of the recommended strategies for wineries to consider (ACIL 2002). For the purpose of this report, small wineries were defined as those which process between 20 and 250 tonnes of grapes annually, while medium wineries are defined as those which process between 250 and 1000 tonnes of grapes annually. The ACIL report includes only a brief reference to the possibility of using the Internet for online sales. It would appear that either ACIL Consulting do not consider the adoption of e-business practices to be one of the possible pathways to profitability for small and

medium wineries, or that the use of Internet-enabled e-business was outside of the scope of the report.

The results of a brief online e-business survey of Australian and New Zealand wine industry organisations, conducted in August 2000 by a professional consulting company called Discovery Management Group (2000) is also available online. The online survey received 166 responses, including 80 from wineries, and the remainder from wine distributors, consultants, retailers, journalists and suppliers (Discovery Management Group 2000). The survey consisted of only ten questions, all closed in nature, and thus the results provide very limited information. Most winery respondents, 90%, thought the Internet offered an improved opportunity to communicate with customers and suppliers, and access new customers. Just over 60% of respondent wineries had a B2C web site, and 30% felt that the option to purchase wine online had had a positive impact on their business (Discovery Management Group 2000).

2.4.2 Winery B2C web sites

Most of the research into the use of e-business by Australian wineries has focussed on the use of winery B2C web sites. An example of a winery B2C web site study involved a '*rapid appraisal*' of twenty winery web sites from each of Australia, California (United States) and Germany, along with an appraisal of differences in the regulatory, economic and technological environments of the respective countries (Stricker, Mueller & Sumner 2001). The research methods employed in this study were described in the paper as '*unrefined*' with the small samples of 20 winery sites from each country not randomly selected and are not representative of web sites in general from each of the respective countries. While this represents a serious limitation to the value of the findings, some of the general remarks are still of interest. A number of differences were found between the web sites based on country of origin. The percentage of Australian sites offering online ordering and payment options (15%) was higher than Germany (0%) but still relatively low compared to California (44%), while the Australian sites were more likely to offer visitor registration options. Australia's export percentage at the time of the study was 43%, considerably higher than Germany's 21% and California's 12%, illustrating an increased focus on exports in Australia's wine market. The study included the

observation that Australia has less restrictions on the production and trade of wine compared with Germany and California (Stricker, Mueller & Sumner 2001).

The degree of benefit that wineries receive or can expect to receive from using B2C web sites as a medium for generating sales to individual consumers has received attention in the popular press and industry journals, with the web sites seen as a way of reducing search costs for consumers (Aplin 1999; Lynch & Ariely 2000; Major 2000). The issue of pressure from supply chain organisations in influencing the online sales strategy adopted by wineries was recognised by Aplin (1999) as a barrier: *'..it is the dangers of upsetting the network of agents, distributors, wholesalers and retailers that may make companies think twice about launching into wine sales over the Internet. That applies particularly to the major companies whom rely heavily on the trade for the movement of large volumes of stock'* (Aplin 1999).

Early predictions gave wine a high suitability rating for online sales. Wine was judged by the US business magazine *Money* to be one of seven products best suited for online buying due to the information-intensive nature of wine marketing (Belsky 1997). This high confidence was shared by the first large online wine retailers, some of which attracted millions of dollars in investment money (Gibbons 2002). However, many of these wine business ventures failed within just one or two years of operation. For example, Winepros.com, established in Australia in late 1999 with over \$25 million investment capital and with the backing of very large companies such as Coles-Myer and News Corporation, was wound up in 2002 after losing millions of dollars and with little prospect of becoming profitable (Gibbons 2002). Wine.com, one of the biggest of the early retailers of online wine in the United States and backed by more than \$200 million of venture capital, filed for bankruptcy in May 2001 (Gunn 2001). An inability to develop efficient logistics in the supply and delivery of the wine, and problems coping with the different legislative requirements of the different States led to the company's demise (Gunn 2001). These failed ventures demonstrate that the wine product alone does not guarantee financial success with online sales, and neither does having sufficient money to build the business in the first place. Consumer behaviour, freight costs and variations in labelling and tariff regulations between different destinations contribute to the difficulties of trading in small quantities of wine outside of traditional wine trading relationships (Aplin 1999).

The literature reviewed thus far on e-business use by Australian wineries is characterised by being very descriptive and general in nature. More detailed research has been conducted on the adoption of B2C web sites by Victorian wineries, and this is examined next.

2.4.3 Web site adoption by Victorian wineries

Research published in 2001 into the diffusion of Internet use within the Victorian wine industry examined the use of e-mail and web sites by four wine industry groups: 1) Victorian wineries; 2) suppliers; 3) distributors; 4) and a range of wine industry associations (Sellitto & Martin 2001). The research involved analysis of historical records from six annual editions of the 'Australian and New Zealand Wine Industry Directory' between 1995 and 2000 in order to summarise and compare the number of e-mail and public web site addresses that were listed for each sector each year, and to compare the growth trends and rates of adoption.

The major findings of interest for this research were that, by the year 2000, 40% of Victorian wineries were using e-mail and 15% had a public web-site, but that both of these adoption levels were lower than those of the suppliers, distributors and wine industry associations. Also the adoption levels were calculated to be well behind those for Australian businesses in general based on figures published by the National Office for the Information Economy (NOIE) as the point of comparison. Using Rogers' DOI framework (1995) and work done on the interdependence and competitive advantage of industry clusters by Porter (1998), Sellitto and Martin described the wineries as 'laggards' because of their relatively low adoption rates, and expressed concern that wineries were not adopting methods of best practice.

Sellitto (2002) conducted further research into factors acting as barriers to Internet adoption by Victorian wineries. Barriers were classified as either technical, for example inadequate telecommunications infrastructure, or social, such as skills, income levels, and reluctance to use new technology. The empirical data was gathered via a mail survey sent to 380 Victorian wineries, including the micro-size wineries that crush less than 20 tonnes per year. Of the 112 responses to the mail survey, 42% were micro size while another 50% were in the small category (processing between 20 and 249 tonnes annually) leaving only 8% in the medium or large size ranges. Of the 23 respondents who had not adopted the Internet, 15 (65.2%) were micro-size and the remaining 8 (34.8%) were small wineries. Thus the

responses – both for adopters and non-adopters of the internet - were dominated by micro or small wineries.

Four barriers were identified by the 23 micro and small non-adopters as being of most influence in their decision not to adopt the Internet: not being aware of the benefits (30.4% or 7 responses); being too busy to investigate the option (30.4% or 7 responses); lacking the required technical skills (30.4% or 7 responses), and not owning a computer (26.1% or 6 responses). Apart from the lack of awareness of benefits of adoption, the remaining three barriers relate to lack of resources. Some of the micro and small wineries indicated that e-business processes were not relevant and therefore of no benefit. For example, one small winery sells all their wine immediately after it is released and claims they need only a telephone to do so (Sellitto 2002).

Some of the conclusions drawn by Sellitto relating to the significance of barriers within the wine industry appear inaccurate due to errors in the analysis of the data. The error is caused by computing the percentages based on the number of non-adopter responses (23) only instead of the number of responses in total (112), and then comparing the results with percentages from the Yellow Pages Business Index Survey that summarised Australian businesses in general regardless of their Internet adoption status. For example, Sellitto quotes from the Yellow Pages report (Telstra & NOIE 2000) that 10% of all Australian businesses do not own a computer. Sellitto then goes on to claim that “Wineries have a higher non-computer ownership of 26.1%, which appears to be significant when compared with this national value”. However his figure of 26.1% is inappropriately calculated from the number of non-adopters only instead of all respondents. Thus, while 26.1% or 6 of the 23 non-adopters indicated that their lack of a computer was a barrier to adopting the Internet, the number of responding wineries that do not own a computer is 6 from 112, which is just 5.4% of the responding wineries. Thus the responding wineries in Sellitto’s survey exhibited a higher level of computer ownership compared with the national average instead of a much lower level as claimed. Sellitto’s conclusion that “*An important discovery in this study is that a substantial proportion of wineries are unable to adopt Internet technologies because they do not own a basic business tool – the computer*” is misleading.

Further research by Sellitto and Martin (2003) into the adoption of e-business within the Victorian wine industry focussed on gathering data on the functionality and purpose of winery B2C web sites. A mail survey sent to 360 Victorian wineries resulted in 107 responses, with 84 of the responding wineries using the Internet. The date of the survey was not reported. Of these 84 Internet adopters, 54 had a B2C web site - half of the 107 respondents. The most common objective of the web sites was to provide background information about the business and the wine products. Other major objectives included: giving consumers information about the wine making process; providing regional and tourism information including direct links to other winery web sites; and providing consumers with the opportunity to join a mail list. Two-thirds of the web sites also provided the opportunity for customers to order wines online (35 out of 54), but most of the wineries reported non-existent or very low levels of online sales of less than 2% of total annual wine sales. Thus the findings show that whereas web sites are useful tools for providing information and supporting relationships with consumers, they are not successful as a direct sales medium. Two reasons were suggested to explain this outcome: firstly, that wine is inherently unsuitable as an online product with the sales potential also limited by the low purchasing power of individual consumers who are unlikely to purchase in large quantities; and secondly that wineries need to avoid conflict with existing distributors and this affects their online strategy (Sellitto & Martin 2003).

2.5 Summary

The literature reviewed in this chapter has ranged from studies of innovation in general to adoption of complex information technologies and e-business processes in particular by organisations. Finally, literature covering e-business adoption by Australian wineries has been considered. Several major sources of influential factors have been identified. These include characteristics of the innovation being adopted and the adopting organisation, with many of these identified in DOI theory and appearing in other research under a variety of labels. Also, complex information technologies, including e-business, are influenced by many external environmental characteristics, including influences related to the marketplace, regulatory frameworks, behaviour of other supply chain organisations, and provision of e-government services. The network externality characteristic of e-business highlights adopter numbers as an additional source of influence.

While a wide range of factors have been identified in this literature review as influencing e-business adoption (and many other types of innovations), the central importance of the degree of relative advantage and the organisation size and resource capacity to adopt have been demonstrated by many authors. However, the literature review has not shed light on just which of the other factors, particularly those from the external environment, are having significant impact on the specific context of e-business adoption by Australian wineries. For this reason, an exploratory pilot study using interviews with winery staff was conducted in order to guide the survey stage of the research project. Details of the research methodologies employed are described next in chapter three.

3 Research Methodology

A description of the research approach is presented in section 3.1, along with a brief discussion of the paradigm in which this work best fits. In section 3.2 the interviews conducted for the exploratory pilot study stage of investigation into the overall research question are described and justified. Section 3.3 includes the justification and description of the survey stage of the research. Evidence of appropriate procedures being followed during the execution of both the major data collection methods used is also presented. The limitations of the research design and methodology are then discussed in section 3.4, ethical issues considered in section 3.5, and a summary provided in section 3.6.

3.1 Research approach

The research consists of two distinct stages, each using a different method and each with a particular focus. The use of multiple methods is recognised as providing increased richness and validity to research results, and better reflects the multi-dimensional nature of complex real-world problems (Mingers 2003). The multi-method approach enables the benefits of qualitative and quantitative methods to be combined, and allows empirical observations to guide and improve the survey stage of the research (Gable 1994; Gallivan 1997).

The first stage - the pilot study - has a focus on general exploration of the overall research question, with an emphasis on gathering rich and in-depth descriptions of both e-business usage patterns by wineries and the perceptions of forces influencing their various adoption levels. Pilot studies are described as any small-scale exploratory research technique that use sampling and which are conducted to serve as a guide for the larger study (Zikmund 2000). Nine interviews with winery representatives, each familiar with how e-business is used within their company, were conducted in the pilot study. Justification of the interviews and a description of the methodology used in their conduct are included in section 3.2.

Analysis of both the interviews and the literature review then led to the finalising of the scope of the research question as well as the development of the propositions which were then explored in the second and major stage of the research. The focus of the second stage is two-fold: first, to collect sufficient data on actual e-business behaviour from as many Australian wineries as possible in order to describe their

current state of e-business usage as accurately as possible; and second, to test the propositions related to e-business and the factors that influence usage patterns. A census survey of all Australian wineries which process more than 20 tonnes of grapes annually was conducted for this stage and implemented via a mail questionnaire. The survey method is justified and discussion related to the conduct and execution of the survey is presented in section 3.3.

Paradigm context for research approach

The approach taken for this research basically assumes a post-positivist paradigm as its context, with an ontological perspective of critical realism underpinning the methodology – that is, that there is a reality of behaviour that, while not likely to be perfectly understood due to its complexity, can be usefully understood to some degree. Also, findings which result from careful, systematic study in which due care is taken to ensure adequate validity and reliability contribute to the level of understanding (Guba & Lincoln 1994). Critical realism is acknowledged as an especially suitable paradigm for information systems research and one which is strengthened by use of multiple research methods for empirical data collection and analysis (Mingers 2000).

3.2 Pilot study using interviews

This section justifies the decision to conduct face-to-face interviews; explains the rationale in the selection of winery respondents; describes the interview approach taken, the transcription procedures, and how the interview data was structured to make the cross-case analysis easier.

3.2.1 Why interviews?

Interviews with knowledgeable individuals are recommended as a suitable technique for helping to narrow down the scope of the research topic and explore the range of issues (Sekaran 2003; Zikmund 2000). The conduct of several interviews to form a multiple case study is recognised as an appropriate method for gathering information on contemporary behaviour within its real-life context, and which is capable of producing findings that are generalizable to theoretical propositions (Yin 1994). Therefore several face-to-face interviews with winery staff expert in their knowledge of how their winery uses e-business were judged to be a suitable mechanism for exploratory investigation into: 1) current e-business activity, and 2) the major factors

that act as drivers or barriers of e-business, including uncovering possible additional factors to those already identified in the literature as influencing IT adoption and diffusion.

3.2.2 Wineries – selection and background information

Face-to-face interviews were conducted with representatives from nine different wineries. The wineries were selected on the basis of their convenience of access, and also on the basis of their size. Larger wineries were preferred due to the likelihood of there being a more extensive range of e-business activity used within their business processes, making them a richer source of the qualitative information needed at this exploratory stage. One of the wineries was selected on the basis of its relatively close proximity to the researcher's home town in South East Queensland, with this interview conducted in April 2003. The other eight wineries were situated in one of the main wine-producing southern States. No further geographical information is provided in order to ensure that the identity of the wineries remains anonymous as assured. The remaining eight interviews took place within a five day period in July 2003.

See Table 3-1 for a listing of the size and ownership status of the nine wineries. They represent a broad range of company structure, size and position within the industry. Using the tonnage ranges of grapes processed annually as the main size indicator, 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 20,000 and over range. The tonnage ranges of each winery are sourced from the 2003 ANZ Wine Directory (Winetitles 2003).

Table 3-1 Size and ownership status of wineries where interviews were conducted

Winery	Tonnage_Range	Size	Ownership
Winery_1	Over 20,000	Very Large	Public
Winery_2	Over 20,000	Very Large	Private, company owned
Winery_3	Over 20,000	Very Large	Private, family owned
Winery_4	10,000-19,999	Very Large	Private, family owned
Winery_5	10,000-19,999	Very Large	Public
Winery_6	10,000-19,999	Very Large	Public
Winery_7	5,000-9,999	Large	Private, family owned
Winery_8	2,500-4,999	Large	Private, share holders
Winery_9	100-249	Small	Private, family owned

The broad size categories used in Table 3-1 are explained in detail in section 5.1.1. 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. All nine wineries are engaged in export of wine, and all are using the internet in some capacity in the running of their business. Six of the wineries are privately owned while three are publicly listed. Of the private wineries, four are family owned, one is owned by private shareholders, and one is owned by an international company. 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. See Table 3-2 for the top 20 rankings in 2002 by three different metrics.

Table 3-2: 2002 Rankings of Australia's top wine companies by three different metrics, with data sourced from Australian Wine Online (2003).

Rank 2002	By Tonnes Grapes Crushed	By Sales of Branded Wine	Top Wine Exporter by Value
1	BRL Hardy	Southcorp Wines	Southcorp Wines
2	Southcorp Wines	BRL Hardy	BRL Hardy
3	McGuigan Simeon Wines	Orlando Wyndham	Orlando Wyndham
4	Orlando Wyndham	Beringer Blass	Beringer Blass
5	Beringer Blass	De Bortoli	Casella Wines
6	De Bortoli	Miranda Wines	Cranswick Premium Wines
7	Cranswick Premium Wines	McGuigan Simeon Wines	McGuigan Simeon Wines
8	Miranda Wines	McWilliam's Wines	Riverina Estate
9	Casella Wines	Casella Wines	Miranda Wines
10	McWilliam's Wines	Angoves	Angoves
11	Kingston Estate Wines	Cranswick Premium Wines	Lion Nathan Wine Group
12	Riverina Estate	Yalumba	Yalumba
13	Wingara Wine Group	Riverina Estate	Kingston Estate Wines
14	Yalumba	Brown Brothers Milawa Vineyard	Andrew Peace Wines
15	Angoves	Lion Nathan Wine Group	McWilliam's Wines
16	Zilzie Wines	Tyrell's Vineyard	McPherson Wines
17	Andrew Peace Wines	Kingston Estate Wines	De Bortoli
18	Peter Lehmann Wines	Peter Lehmann Wines	Tyrell's Vineyard
19	Lion Nathan Wine Group	Wingara Wine Group	Peter Lehmann Wines
20	Beelgara Estate	McPherson Wines	Wingara Wine Group

Interview and transcription procedures

Immediately after the initial introductions were made at each interview the interview consent form (Appendix C) was given to the person being interviewed. Time was given for the form to be read and any questions concerning the conduct and nature of

the interview were then answered. Two copies of the consent form were then signed by both the interviewee and the researcher, with each keeping a form for evidential purposes. Consent for audio-taping was granted in all nine interviews.

The interviews ranged in length from 50 to 90 minutes. Immediately after leaving the winery premises the tape was played back and several pages of notes made. This provided an immediate opportunity for reflection and consolidation of the information provided. It also helped to cope with the intensity of the interviews, with six of them being conducted over a three day period - one each morning, and one each afternoon.

The tapes were transcribed over a three week period, using a cassette transcribing machine, after the completion of all the interviews with the transcripts saved as Microsoft Word files. Great care was taken to ensure the transcriptions were as accurate as possible. An average of eight to ten hours was spent transcribing each interview.

3.2.3 Semi-structured interview content

During the interviews exploratory and descriptive primary data was gathered on the different ways e-business is currently being used within each winery. Respondents provided descriptions of e-business activity as well as their opinions of the reasons for the current usage levels. Perceptions of the benefits of the various e-business processes were solicited. Perceptions of issues or factors acting as barriers to increased levels of e-business use were also sought.

The interviews were conducted in a semi-structured way to make sure that the major areas of potential e-business were covered in each case, which is a recognised approach when the overall area of information needed is known (Sekaran 2003). In this way aspects of field research were combined with a more structured survey type of interview. Open-ended questions on e-business activity were generally followed by more specific questions about particular types of e-business behaviour. The respondents contributed to the pace and direction of the interview, and used numerous examples to illustrate their discussion, as is typical in field interviews (Neuman 2003). In order to get some level of background context a description of the company's size and ownership structure was first requested, followed by a general question on how computers were used in the company. This was then followed by

more specific questions covering the winery's use of internet technologies and the related strategies. The extent of e-mail use was covered, as well as the range of web sites 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 – with gaining online wine export approvals and online Customs clearances, the latter expected to be mandatory at the time of the interviews by December 2003. Further discussion on the impending online Customs changes is provided in chapters four and six.

The position or role of the interview respondents varied between the different wineries – some respondents had an IT focus, some had a marketing focus, while others had a stronger management/strategic focus. Contrasting types of informants, each very familiar with the topic being investigated and the local culture, provide a useful range of perspectives when conducting field research (Neuman 2003). The variety of roles of the staff interviewed proved to be beneficial for this research because it ensured that a very wide range of issues were raised that have some bearing and influence on the behaviours being studied.

3.2.4 Preparing the interview data for cross-case analysis

In order to make cross-case analysis of the interviews easier, much of the interview content was copied and rearranged in an Excel spreadsheet, with data in each row coming from the same winery, and data in each column covering the same topic or general area. Excel was selected because it manages large data sets easily – both for on-screen use and as prints. Organising data into categories within a matrix-like structure is recognised as a useful technique for facilitating pattern matching of qualitative data (Yin 1994). The findings from the analysis of the pilot study data are presented in chapter four.

3.3 Survey using a mail questionnaire

In this section the selection of the survey method is justified; the conduct of a census survey instead of a sample of the population is explained; the development and testing of the survey instrument is described including the conduct of a pilot survey; and finally a description of the final survey execution is given.

3.3.1 Why a survey?

Surveys are suitable for descriptive research where the major objectives are to discover what is happening, and to learn the reasons for particular business activities (Zikmund 2000). The survey method is therefore highly suitable for the second stage of this research into e-business use by Australian wineries, in which the two major objectives are to describe how e-business is being used, and to investigate the degree of influence of some particular factors on the behaviour.

The survey method allows for the collection of systematic and structured data sets from a defined set of people, with potentially many respondents who may be widely geographically dispersed (Easterby-Smith, Thorpe & Lowe 2002). The fact that the *same* set of data is collected from each respondent has distinct benefits. The similarity of the collected data and the fact that it is highly structured allows for direct comparisons of variables between respondents (De Vaus 2002). For example, survey data – empirical data provided by industry participants - allows for theory testing and the exploration of differences and associations between the responses in order to determine if naturally occurring patterns or trends can be detected.

The nature of data collected by survey using a questionnaire is not limited to quantitative data (De Vaus 2002; Zikmund 2000). By collecting levels of agreement with various statements designed to measure particular factors, a survey also enables theoretical propositions to be tested. Thus the questionnaire was selected as appropriate for achieving the two major goals of the next stage of the research: 1) to provide an instrument that collected ‘observations’ of a broad range of activities that collectively describe the actual adoption extent of various e-business processes and their level of usage; and 2) to allow for the collection of respondents’ perceptions and opinions about the degree of influence that particular factors have on the e-business activities of their winery business.

3.3.2 Census survey instead of sample survey

The 2003 ANZ Winery Directory (Winetitles 2003) effectively defines the whole population of Australian wineries at the time the survey was conducted. ‘The Australian and New Zealand Wine Industry Directory’ is published annually, and provides wine industry researchers and analysts with up-to-date wine industry data. The 2003 version of the printed directory was purchased for the purpose of this research and includes a number of databases: wine producers (wineries), suppliers,

distributors, brands, and wine-related organisations. The electronic database of Australian and New Zealand wine producers was also purchased in the format of a Microsoft Excel spreadsheet. The spreadsheet includes eighty three fields (columns) of winery data, including contact information such as names, addresses, phone and fax numbers, the names of key personnel, vineyard information and production information such as tonnes processed. The spreadsheet format was selected for ease of analysis, sorting, and for the generation of individualised cover letters and mailing labels through a mail merge process with Microsoft Word.

For the purpose of this research the 2003 electronic database of wine producers represents the finite population of Australian wineries at the time the research was undertaken. The existence of the database allows a census survey to be carried out because the population members are known, and contact details for all members are available. The decision to undertake a census rather than survey a random sample was taken for several reasons: the census effectively eliminates the problems associated with sampling error; the census was possible because the finite population was known; and the costs of conducting the census were within the available budget.

For the purpose of this research, the target population of Australian wineries was limited to those wineries that process more than 20 tonnes annually. This decision eliminated the 485 micro-size wineries which have little impact on the wine industry due to their very low production levels and limited market focus (ACIL 2002). This left a total population of 1065 wine producers listed under separate company names, each processing twenty tonnes or more. The option to survey all 1065 population members was selected in preference to a sample survey because it eliminated any danger of the sample not being fully representative of the population and consequent sample error (Easterby-Smith, Thorpe & Lowe 2002). Thus all wineries in the target population had the opportunity to participate in the survey. Limitations introduced by the self-selecting nature of respondents apply regardless of whether the surveys are sent to a sample or to the whole population. Limitations resulting from the methodology are discussed in section 3.4.

Table 3-3 shows the breakdown of the number of wine companies for each of the annual tonnage processing ranges commonly used by the industry (Winetitles 2003). From this data it is evident that there are many more very small wine companies than very large ones. However what is not evident is the sheer size and impact of the wine

companies (or wine groups) in the top size brackets. For example, the Australian Wine Online site reports that just two of the companies – Southcorp Wines and BRL Hardy - account for almost half of the sales of branded wine, while the top twenty two companies account for 96% of total sales (Australian Wine Online 2003).

Table 3-3 Number of wineries in 2003 for each annual tonnage range processed

Wine Company's Tonnage Range Processed Annually	Number in 2003 Directory
20-49	379
50-99	226
100-249	196
250-499	96
500-999	54
1000-2499	45
2500-4999	26
5000-9999	17
10000-19999	13
20000 and over	13
Total	1065

Source: Data summary from 2003 ANZ Wine Directory (Winetitles 2003)

3.3.3 Development and testing of the mail questionnaire

The questionnaire went through various drafts and various stages of development and testing which are described next. The survey was structured around the major e-business domains under investigation:

1. Business use of e-mail;
2. Business use of Web sites operated by groups external to the winery;
3. Winery's public web site, available to the world audience;
4. Winery's extranet site with access limited to relevant business groups, with a focus on supporting B2B activities; and
5. Winery's intranet site with access limited to winery staff, with a focus on supporting internal operations.

The major objectives of the questionnaire are 1) to collect data on the level of activity in the five areas identified above, and 2) to collect perceptions on the degree of influence of the identified factors on activity in each area by including statements to which respondents indicated their level of agreement.

First draft – too general

The first draft of the survey had two distinct parts. The first part focused on actual usage, and was divided into sections for each e-business type. The second part consisted of a long list of general statements with agreement level measured on a five point Likert scale aimed at testing the level of agreement about the influence of the factors identified as influential factors. However this structure was changed after realising that the separation of the statements from the usage data would seriously limit the range of possible findings as the general nature of the statements could not be linked to any specific type of e-business.

Second draft – lacking sufficient consistency and coverage

The second draft was structured around the various types of e-business. The statements were rewritten in order to be specific to a particular domain of e-business and were grouped in the relevant section. While this change produced the desired effect of linking perceptions of degrees of influence of individual factors with particular e-business types, the new structure revealed an additional flaw - not every combination of factor/e-business type was covered. After due consideration, it was decided that it was important not to pre-judge the level of potential impact that any of the identified factors may have on any of the different types of e-business, and that each possible combination needed to be addressed. This observation led to the third major draft, discussed next.

Third draft – ensure consistency

Two statements addressing each of the four factors were explicitly included for each e-business type to ensure consistent coverage. An additional section on e-business in general also included two statements for each of the four factors. This resulted in eight statements for each of the five e-business types, plus the general feedback section, giving a total of twelve statements for each factor, and forty eight statements overall. Table 3-4 lists the final statement numbers for each section, illustrating the symmetry and the completeness of the factor coverage.

Table 3-4: Statement numbers in the printed version of the mail questionnaire, showing two statements for each factor/e-business pair.

E-business process Factor	E-mail	Use of external Web sites	Winery's own public Web site	Winery's own extranet	Winery's own intranet	E-business in general
Perception of relative advantage of e-business	2.6, 2.7	3.6, 3.7	4.10, 4.11	5.6, 5.7	6.5, 6.6	7.2, 7.3
Perception of resource capacity to adopt and use e-business	2.8, 2.9	3.8, 3.9	4.12, 4.13	5.8, 5.9	6.7, 6.8	7.4, 7.5
Supply chain influence	2.10, 2.11	3.10, 3.11	4.14, 4.15	5.10, 5.11	6.9, 6.10	7.6, 7.7
Influence from behaviour and activities of the Australian Government	2.12, 2.13	3.12, 3.13	4.16, 4.17	5.12, 5.13	6.11, 6.12	7.8, 7.9

Content validity test – round one

The next major stage of development of the questionnaire involved a number of tests designed to increase the validity and reliability of the instrument. The methodology followed for this stage was based on the method used by Moore and Benbasat (1991) in their development of a survey instrument designed to measure the perceptions of adopting an information technology, based on Rogers' Diffusion of Innovation theory.

First, the survey statements developed for this research were tested for content validity. The statements were collected together, and printed four times. The prints were then cut to separate each individual statement, giving four sets of 48 strips of paper, each of which contained a single statement. Each set of statements was shuffled, placed in an envelope, and given to an academic colleague for sorting.

Each of the four colleagues was provided with a brief background of the research topic so that the context of the statements was understood. The factors were not identified or named at this stage. The academics were asked to sort the statements into groups that they felt logically belonged together in some way. Furthermore, they were also asked to provide a label that best described the purpose of each of the different groups they constructed.

The results of this stage of the testing were instructive and helped to identify some problems with some of the wording of some of the statements. The feedback also revealed a high degree of similarity between the suggested labels for each factor

given by each sorter, and the actual factor name as intended. The proposed factor names are shown against each intended factor name in Table 3-5.

Table 3-5: Individual sorters' factor labels

Intended factors	Sorters' proposed factor labels			
	1	2	3	4
Perception of relative advantage of e-business	Pros and cons of online	Use of internet	Communication	Communicate
Perception of winery's resource capacity to adopt and use e-business	Capacity	Resources	Resources	Factors limiting a company's use of e-business
Influence of behaviour and activities of supply chain groups	Supply chain	Industry/ customers	Supply Chain Management	Supply Chain relationship
Influence of behaviour and activities of the Australian Government	Interactions with government	Regulations	Government/ Regulations	Comply with Government regulations

The supplied names from each sorter for the factor of perceived relative advantage had the lowest level of matching with the intended factor, with only the proposed name of “pros and cons of online” from Sorter 1 having an acceptable level of correspondence with the idea of relative advantage. The other three suggested labels – ‘use of internet’, ‘communication’ and ‘communicate’ - emphasise the nature of the related task rather than the nature of the benefit. The percentage of ‘relative advantage’ statements were also correctly placed in each sorter’s corresponding category only two-thirds of the time. The statements were therefore re-worded in order to emphasise the actual advantage of adopting an e-business process rather than the task for which the e-business process was used.

The remaining three factors had a high level of correspondence between the supplied factor name and the intended factor. The percentage of statements correctly placed in each sorter’s corresponding categories was also acceptably high, (resource capacity – 93.8%, supply chain – 81.3%, and government – 87.5%) indicating that the statements had acceptable prima facie content validity although there was still room for improvement.

As a result of this first stage of testing for content validity, the purpose of each statement was again carefully considered. Several wording changes were made and the revised set of statements were once again printed four times and cut into four sets of 48 individual statements for the second round of testing, which is described next.

Content validity test – round two

In the second round of testing each set of revised statements was given to four different academic colleagues. The focus of this round of sorting was to build from the feedback gained from the first round and improve the ratio of correct placements of statements into the intended target category. The names of the actual factors were provided to each sorter. Each sorter was asked to place the statements into groups which they felt best matched the four given factors. They were also informed that if they felt a statement did not belong in any of the four categories supplied, they could leave it out.

The results of this stage showed a very high ratio of correct placements of statements into their intended target category, with the average ratio of correct hits for all forty eight statements by the four sorters being 93.8%. No statement was misplaced more than once by the four sorters. The results provided evidence of acceptable alignment between the statements and their intended target factor.

Testing the whole questionnaire

The next stage of testing involved seeking feedback about the structure and content of the whole questionnaire from a number of academic colleagues including statisticians and others experienced in the conduct of social surveys. Comment was also sought on the content of the cover letter designed to be sent with the questionnaire. Feedback collected from this stage resulted in some minor changes to the wording of some questions, but the essential nature and structure remained unchanged as a result of the collective advice given.

Recognising the purpose of the question and the nature of the answer is important in the construction of an effective questionnaire (De Vaus 2002). The three major types of question content used on the questionnaire related to 1) *behaviour* of the adopting firm; 2) *beliefs* of the respondent as a knowledgeable representative of the firm; and 3) *attributes* of the firm. Consideration of the content type was given when considering the value of the answer in helping to shed light on the overall research

question. Also awareness of the content type aided the wording and clarity of each question.

The inclusion of all major e-business process domains and inclusion of statements covering all factors in all domains resulted in a long questionnaire. While the fact that the questionnaire is long may be considered by some as a likely factor in increasing the non-response rate, De Vaus (2002) questions this judgement. According to De Vaus, review of the evidence shows little support for the view that the length of the questionnaire by itself is a strong determining feature of non-response rates. Instead he recommends that while the questionnaire should not be made longer than necessary, the relevance of the content and the attention to detail in minimising the burden of completion are worthy of greater attention and concern. Thus the number, range and content of the questions were not sacrificed just to make the questionnaire shorter, but instead were included for their relevance.

3.3.4 Pilot testing of the survey

Pilot testing of the survey was carried out with several of the larger New Zealand wineries because the only Australian wineries outside of the target census population were the micro wineries that processed less than twenty tonnes per year. An initial trial with a few wineries from this micro-size category revealed that their limited amount of resources, very low level of e-business activity and very small market share did not make them an acceptable substitute for members of the target population. New Zealand wineries of a similar size to those in the census survey were deemed to be a better substitute, even taking into account the reduced relevance of questions relating to Australian conditions. Seven New Zealand wineries were contacted, and the wineries selected were weighted towards the larger companies in order to maximise the amount of survey content that would apply to each winery.

Representatives from five of the seven wineries completed the online version of the survey, with responses submitted in an e-mail. The respondents indicated that the length was acceptable, and indeed unavoidable for the range of content covered. One respondent also rang back and a long telephone conversation followed in which general issues relating to e-business use by wineries were discussed, including some detailed feedback on the survey form itself. This led to further refinement of some of the questions. For example, question 1.7 was changed from “Is your winery connected to the internet?” to “Does your winery have access to the internet?”

because the respondent felt the original wording might be taken to mean some permanent type of hardware connection which was not what was intended. Other respondents gave general feedback either by adding it in the comments section of the survey or in a separate e-mail. The overall feedback was positive, with no-one critical of the length of the questionnaire or the range of content being covered. Interest in the survey appeared to be high, with respondents indicating they were interested to see the results.

3.3.5 Survey execution

Addressed to the CEO or equivalent position as described in the electronic database of Australian wineries, 1065 questionnaires were mailed out on 22 and 23 October 2003 with a cover letter and a reply-paid envelope. See Appendix D for an example copy of the covering letter and Appendix E for a copy of the survey form.

Several steps were taken in an attempt to maximise the response rate: care was taken with the cover letter to ensure that the purpose, relevance, and high ethical standard of the research were clearly evident (De Vaus 2002); the use of survey numbers to identify non-respondents for follow up purposes only was explained; and each letter was also individually signed to add a personal touch (Dillman 1978).

The available research budget allowed for the printing of sufficient questionnaires for a single mail out only. Selected non-respondents were contacted by telephone as a follow-up method. Only non-respondents from the very large size wineries (those processing more than 10,000 tonnes of grapes annually) were selected for follow-up by telephone because with only 26 companies in this size range each response represents a significant proportion of the total of this size range, and thus each response from the very large wineries was especially valuable. Also, time and cost constraints prevented a larger follow-up. An extra field in the SPSS database was included so that responses from the follow up stage could be identified when early/late response bias was checked.

3.3.6 Data entry methodology

The questionnaire responses were stored in SPSS version 11.5, with some coding alterations from the codes as displayed on the questionnaire. The responses were carefully sight checked after entry to eliminate the chance of data entry errors. As well as respondents' answers, the date of receipt by the researcher and the survey

number were recorded. The following coding changes for survey answers were made:

- All “Do not know” responses were coded as a 6. The “Do not know” responses to the statements requiring an indication of agreement level were treated as missing values. This allowed an accurate mean value of agreement level to be calculated.
- All “No” responses were coded as 0 (zero) while all “Yes” responses were coded as 1 (one).
- Missing user responses were coded as a 9.
- Most of the statements requiring a level of agreement responses are positively worded and are coded as follows: Strongly Disagree = 1; Disagree = 2; Neutral = 3; Agree = 4; and Strongly Agree = 5. However some of the statements are posed using negative wording. The responses to these statements were recoded so that: Strongly Disagree = 5, Disagree = 4, Neutral = 3; Agree = 2; and Strongly Agree = 1. Calculations using recoded values are flagged with the letter R.

3.4 Methodology limitations

A limitation in both the pilot study and the survey is that in each data collection method – interviews and mail questionnaire – only single informants were used to report on the activities of their respective organisations and to provide reasons for that behaviour. There is no way of accurately judging the adequacy of the informant’s reporting capacity (Orlikowski 2001; Rogers 1995). The danger of this approach is that it reduces the complexity of the organisation down to the viewpoint of a representative individual, with no opportunity of cross-checking the reliability or level of accuracy of the responses against the responses from another informant from the same organisation as recommended by Rogers (1995) for research into organisational innovativeness. It is reasonable to presume that the collected data is likely to differ in some degree if a different individual had responded. However, due to the broad scope of the research topic and the need to get responses from as many different wineries as possible, it was not possible to increase the number of informants.

With regard to the interviews conducted in the pilot study stage, it would have been beneficial to have conducted sufficient interviews so that the point was reached where no new information was being provided, as is recommended for this exploratory stage (Sekaran 2003). A pragmatic decision to complete the pilot study after the completion of the nine interviews was made after it was clear that some common themes were emerging that were worthwhile of further study, and that these should be sufficient to make a worthwhile contribution to this area of research .

While all wineries had an opportunity to participate in this study, many wineries did not do so and the reasons for their non-participation are largely unknown. The fact that the questionnaire respondents are self-selected introduces potential bias and therefore limits the generalisability of findings. It is likely that the respondents have a generally higher interest in and uptake of e-business processes than the non-respondents.

The researcher had no control over who filled out the form, and information on the position title(s) of those completing the form was not gathered. However, while this limitation is acknowledged, it is reasonable to assume that the addressees – the CEO's (or their equivalent) – have ensured that an appropriate person with adequate knowledge of the e-business status of the company filled out the questionnaire if they did not do so themselves.

3.5 Ethical considerations

An “Information and Consent Form for Interview Participants” was prepared and presented to the USQ Ethics Committee at the time ethics clearance for the research project was requested. Notification of ethics clearance for this research is presented in Appendix B. The consent form includes: background information about the research; a definition of how the term “e-business” is defined for the purpose of this research; an assurance that no identifying information on the winery or any staff member of the winery will be made at any stage; and a request for permission to audio-tape the interview. The form was approved in the process of gaining ethics clearance for the project. See Appendix C for a copy of the consent form.

Complete anonymity was promised to all interview and survey respondents to ensure that they felt confident in passing on information that was private in nature and

possibly commercially sensitive to the business operations of individual wineries. This was necessary in order to maximise the participation rate of wineries. A great deal of care has been taken to ensure that the anonymity of all respondents and their respective wineries is protected. Some winery-related information has not been included in the report because it might enable identification in some cases. For example, the position descriptions of the interview respondents have not been included, as some position descriptions were unique to a particular organisation.

3.6 Summary

In this chapter the research methodology was described. The overall research plan consisted of two major stages with two different research methods: 1) pilot study using face-to-face interviews; and 2) a census survey using a mail questionnaire. The interview approach and conduct of the interviews was described, followed by transcription procedures and preparation of the transcriptions for analysis. Chapter four reports on the analysis of the pilot study interviews.

A description of the development and testing of the survey instrument was also provided. The mail questionnaire was tested in a small pilot survey using respondents from New Zealand wineries, which were selected as the best substitute organisations for Australian wineries processing at least 20 tonnes of grapes annually. Chapter five provides a detailed analysis of the survey data, including testing of the propositions.

4 Analysis of Pilot Study Data

Information gathered during the pilot study interviews is now discussed. First, a brief description of each winery and interview is presented in section 4.1. The unit of analysis for the survey stage is clarified as a result of the interviews in section 4.2. Cross-case analysis of the major interview themes is given in section 4.3. In section 4.4 the factors selected for further investigation in the survey stage are identified, and propositions are developed for further investigation in the survey stage. This is followed by a summary in section 4.5.

4.1 Individual interview summaries

A short description of each interview and a brief background on the winery is provided in decreasing order by winery size. Information that is likely to make identification of the winery possible due to being highly distinctive is omitted in order to protect the anonymity of the wineries. The winery size categories are discussed and defined in section 5.1.1.

4.1.1 Winery 1

Winery 1 is a very large, publicly owned, wine company with a number of wine production centres in Australia. The company has several national and international offices, and employs well over 1000 staff. Computer technology is used throughout every aspect of the organisation, and all international data transfers between company offices occur via the Web. E-mail is used extensively and is considered a very useful communication medium for a company that is spread across several geographic locations in Australia and overseas.

The company has multiple public web sites, an extranet, and an intranet. The public web sites are brand-specific, and the main purpose of each of these is product promotion and provision of general company information. Future plans for the web sites include using them as a medium for increasing interaction with customers, and as collection points for consumer data in return for participation in such activities as online competitions and wine clubs. Online sales are expressly avoided in order to avoid conflict with major business customers.

The intranet site is considered a useful and important part of the internal communication system for the company, with the web increasingly used to support

collaborative workgroups and to share information and documentation. The extranet is also considered to be an extremely important part of the winery's e-business strategy. The extranet allows business groups, particularly trading partners, to serve themselves to a large range of detailed product-related information including profiles of wine makers and high quality product images. The extranet achieved its return on investment after just six months of operation and is considered by winery management to be highly successful. The other major B2B site used by Winery 1 is EANnet – all product data is supplied to EANnet for access by major Australian business customers such as Coles and Woolworths.

While the extranet successfully supports B2B post-production activities, the level of web-based B2B e-business activity during the purchasing and production stages is almost nonexistent. All procurement is done manually. However, e-business processes are currently being developed to support one of the winery's bottle suppliers: wine production schedules will be provided via a web interface to the bottle manufacturer so that bottle production schedules can be matched to winery needs in order to guarantee the required number of the correct colour of bottles at the right time. As well as streamlining processes to increase efficiency, the exchange of vital schedule information via the web will strengthen the relationship between the winery and the glass manufacturer, providing benefits to both organisations.

At the time of the interview, Winery 1 was investigating a number of options in the development of a web interface with a new cargo system being implemented by the Australian Customs Service for an expected cutover date in September 2003. The new customs system, called the Integrated Cargo System (ICS), will replace the existing EXIT system. The change-over date from EXIT to ICS has been delayed several times since the interview with Winery 1 was conducted, and the revised cutover date is now October 2004, preceded by a two-week transitional period. The ICS will improve security by using encrypted web transactions based on public key infrastructure. All exporters will provide evidence of identity via digital certificates that must be registered with Australian Customs (Australian Customs Service 2004). The Winery 1 respondent described the need to develop the web interface to the new system as "*e-business being forced on us*" through legislative requirement.

One of the biggest barriers to future growth and development of e-business processes for Winery 1 is the problem and cost of developing interfaces for more than 40

legacy systems. The complexity of the existing computer systems complicates the adoption and use of many potential e-business initiatives - the cost of replacing all the systems with new ones based on an XML standard simply cannot be justified. The costs associated with software development for e-business initiatives are described as “*horrific*”, and often deliver very little return on investment when legacy systems exist. Another major barrier is the concern with lack of data integrity in existing databases. Before the winery can increase automation of transaction processing through replacement of manual processes with e-business based processes, the integrity of internal data needs to be carefully checked and updated.

However, even taking these barriers into consideration, the prediction for the future of e-business within Winery 1 is that its use will increase dramatically within the next 12 months.

4.1.2 Winery 2

Winery 2 is a very large, privately owned wine company with over 1000 employees. Computers are used extensively throughout the company and in all stages of business activity. E-mail has become an extremely important communication medium for the company. The company has several brand specific public web sites which function purely as brochure sites, with no online sales options provided due to the need to avoid conflict with business customers. The winery also has an intranet, and plans to use this site more extensively in the near future as the central distribution point for company information and company forms. Improvement in internal communication is considered to be the greatest benefit that the winery has received from e-business usage thus far. The winery does not have extranet site.

The level of e-business activity within the company is fairly low, although the winery does use the online government sites for compliance purposes where possible because the processes are deemed more efficient and therefore cheaper: for example, their wine export approvals and customs clearances are processed online. The winery is also trialling the use of EANnet as a way of supplying product data to major business customers as a result of pressure from those customers, in particular Coles and Woolworths. The major barrier to increased use of e-business within the winery is judged to be the often poor quality of the Telstra networks in rural and regional areas where much of the winery infrastructure is located. Also the lack of e-business standards is cited as another barrier to further adoption.

4.1.3 Winery 3

Winery 3 is a very large, privately owned winery with offices in all Australian states and approximately 250 employees. The winery uses online processes for compliance where possible. For example, their wine export approvals are processed via the web interface. The major production centre is located near a major regional town but it is further than three kilometres from the nearest Telstra exchange which means that in practice there are major limitations to the available internet access options. Broadband is not available for example. The lack of government funded telecommunication infrastructure capable of supporting fast and reliable Internet access represents a huge disadvantage for the winery. For example, a standard internet connection at their regional production site has an annual cost of \$11,000 and runs at 130th of the speed of a similar internet connection at their city office which has an annual cost of \$2,000. The winery spends an additional \$90,000 a year to upgrade their internet connection speed at the regional winery location to acceptable speeds, and Telstra has required up-front contributions of approximately \$100,000 for infrastructure upgrades. The winery has little choice other than to make these investments in order to get sufficient speed for transaction processing across the Web.

E-mail has become the standard communication medium for the company. The winery currently operates an extranet site in order to provide self-service of product images and product information to their business customers both within Australia and around the world. It is likely that the winery will soon adopt EANnet as an alternative mechanism for making this information available to some major business customers. The planned adoption of EANnet will occur as a direct result of the requirements of the large retail customers such as Coles and Woolworths. The winery does not use any internet-enabled processes to support purchasing activities, with the major reason given that the *“guy that looks after that area is quite elderly and he doesn't like change”*.

The winery has an intranet site which is used mainly to support the quality system, with all documentation, policies and forms published on the intranet. The intranet is considered to be a big improvement over the paper-based system it has replaced. The winery also has a B2C web site which promotes the winery and product brands, and provides links to both the national and world-wide distribution chain. The provision

of direct online sales from their web site is not included due to associated costs and the need to avoid conflict with major business customers.

The winery accesses a number of government web sites, and uses online processes for their wine export approvals and Customs clearances. The respondent indicated that the impending change to the Customs system meant that the winery had no choice but to make changes in this area if they wanted to continue exporting.

4.1.4 Winery 4

Winery 4 is a family-owned private company. For the purposes of this research, the winery is classified as very large, processing within the range of 10,000 – 19,999 tonnes of grapes annually. However the interview respondent describes the winery as medium sized in comparison with the handful of Australian wineries that have a larger annual production volume. The comment helps to illustrate the high level of variance within the sizes of the very large Australian wineries – even within this group many of the wineries feel relatively small in comparison to the largest three or four wine companies. While the annual production volume of Winery 4 is lower than Winery 3, Winery 4 has almost twice as many staff: about 450 compared with 250 for Winery 3. Unlike Winery 3, Winery 4 is located in a major wine tourism area and operates a large visitor centre and cellar door facility with full catering services.

Computers are used extensively within the winery, with several offices located in Australia and overseas. E-mail is very important within the company, and has become the standard communication medium. At the time of the interview the winery was developing a system to enable them to use online compliance processes for gaining their wine export approvals and customs clearances, and it was anticipated that this would be operational by October 2003. Expected benefits include improved efficiency and automation of work that is boring in nature, thus freeing up staff to do more interesting work.

The winery has a public web site, but online sales are specifically not included because they would undermine the existing distribution chain. The winery also has an intranet, the major purpose of which is to distribute information - policies, procedures and forms - efficiently and quickly to all staff regardless of their geographic location.

With regard to B2B e-business, the winery is just starting to look at online procurement possibilities now that some of their suppliers – carton manufacturers for example - have begun promoting their web sites. However at the time of the interview no online procurement was occurring. The winery has an extranet which is regarded as important and beneficial. The extranet provides images, company and product information including tasting notes, and is used by a number of organisations from the winery's supply chain including suppliers and distributors, as well as press groups.

The winery plans to start supplying their product data to EANnet soon in order to satisfy the requirements of their major business retail customers. The driver for the adoption is coming from the business customers rather than from the winery. Very high levels of internal data integrity and highly reliable software have been identified as essential pre-requisites of the adoption of EANnet and future B2B e-business initiatives. This is due to the fact that increasing adoption of e-business means an increasing reliance on automated processes and fewer opportunities for manual checks. At the time of the interview winery staff were busy checking internal electronic product data in order to ensure its reliability and accuracy so that product data could be supplied directly to EANnet from internal databases.

The Winery 4 respondent considers e-business adoption within the winery is occurring in an evolutionary way, involving many small steps rather than as a radical technology that is transforming the way business operates. One reason that an evolutionary approach is preferred relates to the increased automation and loss of manual checks associated with e-business transactions. Caution associated with change and increasing reliance on the integrity of electronic data means that each new e-business process will need to be tested and trialled carefully before people feel confident to use additional e-business processes.

4.1.5 Winery 5

Winery 5 is a publicly owned winery in the very large category, processing between 10,000 and 19,999 tonnes of grapes each year. The winery has approximately 80 staff, and has several offices in Australia as well as overseas. All wine sold within Australia is sold through a single distributor. The major objective of the winery's public web site is to build and promote the winery's brands. The public web site is also used to provide financial information to shareholders and the general community

in a timely and cost-effective manner. An online sales option has recently been added as a service to individual consumers who are unable to source the wines from retail outlets. Online prices are deliberately set at full retail price to avoid conflict with their Australian distributor and retailers.

The winery has an intranet in place, the main purpose being to share information among staff in order to increase consistency, quality and teamwork opportunities within the company regardless of staff location. An extranet site for trade customers around the world is planned in the near future, and will provide access to communication options, product information and images.

The winery has an e-business strategy that is clearly articulated and planned. The winery plans to use e-business processes to make it easier for other organisations in the winery's supply chain to do business with them and thereby differentiate themselves from other similar size wineries. The e-business adoption approach uses incremental rather than radical steps in order to reduce the amount of change staff need to absorb at any one time and to make it easier to gain the confidence of management and major shareholders.

The first phase, already completed, focussed on network security issues, the implementation of a standard desktop operating environment and improving internal data integrity. The second phase, currently underway, concentrates on the winery's web sites: the public web site has been replaced, the intranet has been added, and the extranet site will soon be added. The main aim of the third phase is to use the e-business processes to help the winery become more demand driven than production driven to match the change occurring in the marketplace: for example, support smaller and more frequent bottling runs in order to reduce warehousing costs.

At the time of the interview, the winery was also planning its response to the impending and mandatory change of gaining customs clearances through a web interface. In May 2003 winery staff attended an information session, hosted by Australian Customs, where they were informed that they must purchase a digital certificate for evidentiary purposes, and that there would be a two week hand-over period in December 2003 between the old Exit One system and the new web-based system.

The main barrier to further e-business adoption identified by Winery 5's respondent is their use of a proprietary enterprise resource planning (ERP) system called EzyWine (Ezy Systems 2003) which has been specifically developed for Australian wineries. EzyWine consolidates all winery-related procedures into an integrated system and has provision to collect all necessary data to meet the statutory requirements of all business employers and wine related legislation. However, the problem with EzyWine as far as e-business goes is that the software is not written using an open standard, and the opportunities to develop interfaces with other software systems are very limited. EzyWine is identified as a risk factor for Winery 5's e-business future because it is almost impossible to extract data from the system in a format that can be easily used on the web.

4.1.6 Winery 6

Winery 6 is part of a larger agricultural company that is publicly owned, with offices in a number of rural areas. The winery fits into the very large size category, processing between 10,000-19,999 tonnes of grapes annually and operates with 35 staff. Unlike the other wineries, almost all of the wine is sold in bulk to other companies. The winery has recently added its own brand of bottled wine to meet local demand, but this aspect of the business is still very minor.

The winery uses e-mail extensively within the company for distributing document files and for general communication. E-mail is judged to have improved the level of internal communication significantly. A small amount of online procurement of supplies is occurring, and the experience so far has been positive: purchasing supplies online has proven to save time and money. The biggest barrier to increasing online procurement is the lack of major suppliers providing this service, and there is little indication to suggest that this situation will change in the near future.

Online compliance for wine export approvals is not used, with the lack of visible advantage and the training burden associated with changing the way the approvals are obtained given as the two main reasons for not adopting this option. However, online compliance is used in both the taxation and Work Cover areas. Government web sites are used regularly by winery staff to keep up-to-date with all legislative requirements, and the quality and extent of government information online is viewed very positively. There is a perception that the winery is being encouraged to use the internet more and more by various government agencies.

The parent company of the winery has a public web site which is basically a brochure site with a focus on providing financial and company information to actual and prospective shareholders. The winery operations and wine products are only briefly described. The future role of the web site is currently being re-assessed but no major change in strategy is expected. The winery does not yet have an intranet, but there are plans to create one within the next year in order to cut down on internal e-mail traffic. The winery has also considered the idea of building an extranet site to interface with their growers, but this is not likely to occur for at least three or four years.

The winery uses EzyWine as their main software system, and similar to the situation in Winery 5, EzyWine is seen as a technical barrier to some of the e-business adoption options in the future. However e-business is not viewed yet as a vital part of the business operations, and has less advantage to offer the business than the benefits currently offered by systems such as EzyWine.

4.1.7 Winery 7

Winery 7 is a private family owned business with 14 full time employees and has been in operation for five years. It is a large size winery that processes between 5,000 and 9,999 tonnes of grapes annually. Approximately 70% of the wine is sold in bulk while the remaining 30% is bottled under the winery's own brands. The volume of export and domestic sales is almost equal. The winery is over 200 kilometres from the nearest capital city, and further than three kilometres from the nearest Telstra exchange with broadband access to the Internet unavailable. Computers are used extensively throughout the business operations, and EzyWine is the main software system.

E-mail is used extensively for all business and government related communication, and hence is now considered a very important aspect of business operations – and especially so for international communication. The ease and speed of e-mail and the ability to transfer electronic documents between the winery and government/business groups is considered a real advantage over alternatives. While e-mail is now viewed as a vital part of the business operations, the same is not true for the use of web sites.

The major restriction of the web relates to the access speeds available – the download speeds via the local internet service provider are simply too slow for

external web sites to be an efficient information source. However the winery uses online banking, processes their wine export approvals online, and uses the web to investigate suppliers and products. The winery expects that they will continue to adopt more and more web processes as they become available and prove beneficial. At the time of the interview the cost of connection through ISDN or satellite in order to overcome the speed restriction was being investigated. The company wants to have increased download speeds and improved access options from off-site locations to better support e-business operations such as the impending web interface for Customs clearance using the ICS.

Winery 7 has its own public web site that acts simply as an advertising brochure. There is currently no option to buy online, although the winery plans to add mail order facilities and publish a regular newsletter on the site. However the web medium is not viewed as a likely mechanism for generating market growth. Two major reasons were provided: 1) consumers need to know the wine before they buy it, unless it is on a very cheap special; and 2) undercutting the cost of the wine to grow web sales produces a conflict with existing business retail customers which would be detrimental to sales overall.

4.1.8 Winery 8

Winery 8 processes between 2,500 and 4,999 tonnes of grapes annually, putting them in the large size category. The winery is owned by a group of private shareholders, has 12 employees, and exports 50% of all their production. Computers are used extensively throughout all areas of business operations. E-mail is considered crucial for business communications, particularly where these are international. The winery also has two types of web sites: 1) a public web site that acts as an electronic brochure, describing the company and the products, and which includes links to sites of major retail customers; 2) an extranet site which includes media images and promotional material for agents, business customers and distributors.

The decision not to include online sales on the public web site and instead provide links to websites of major business retail customers is a deliberate strategy to avoid conflict with these customers. The role of the public web site is limited by the lack of uptake by consumers. At this stage the functionality of a brochure site as opposed to a more sophisticated and interactive site is considered both effective and appropriate. The extranet site is considered the most useful of the winery web sites. The extranet

reduces costs and improves both efficiency and quality in supporting the marketing side of the business, with the benefits described as “immeasurable”.

The winery adopts online transaction processing where it is offered on the web sites of external groups: for example, the winery uses online transactions to gain export approvals from the Australian Wine and Brandy Corporation, and to order bottling requirements and schedules with their bottling company. The winery is happy with the move by the Australian Customs Service to introduce a secure web interface for gaining customs clearances because web processes are generally considered more efficient than alternatives and therefore reduce costs. However the benefits of e-business, while acknowledged to be valuable, do not match the hype and promises made by early e-business proponents. These early promises are viewed as excessive.

Some major barriers to the growth of e-business use in general were identified: consumers’ reluctance to shop via the Internet; the lack of online sales options provided by major retailers; and the after-effects of the dot.com crash in 2000. The wine industry is considered to still be a very conventional and traditional market despite the extensive changes in the use of technology at the production end of activity. Wineries are not considered to be in a position of leadership as far as pushing further e-business adoption by organisations within their supply chain – the prediction is that e-business developments will occur in step throughout the industry and will depend on the actions of others – particularly major retailers.

4.1.9 Winery 9

Winery 9 is a small size winery processing between 100 and 249 tonnes of grapes each year, and is a private family-owned business with 18 full time staff. The winery also crushes grapes and makes wine for a number of other very small wineries in the region, and has the capacity to crush up to 600 tonnes of grapes each year. However this capacity has not yet been reached due to low crop levels affected by drought.

The winery operates a cellar door with dining facilities, and sells to both domestic and international distributors and retailers. Export sales are preferred to sales at the cellar door because of the much lower costs involved. Operating a cellar door with dining functions carries very high overhead costs, and the volume of wine sales to individual consumers is very small compared with export orders for hundreds of cases. The export markets are typically set up through personal contact on business

trips to the overseas markets in Europe, Asia, and America. However exports to Canada have been successfully achieved without any personal meetings taking place, and have instead been negotiated through some phone calls but mainly through e-mail. The winery has also recently started using e-mail lists to communicate with their wine club members, and where possible are now sending their regular newsletter out in electronic form rather than through traditional post. This change has reduced costs associated with the wine club significantly. E-mail is now regarded as a vital communication medium for the business.

The winery has a public web site, and offers online sales of wine with the option to pay online through a secure connection provided by the winery's internet service provider. However the volume of sales has been very small, with only two or three orders coming in each month. The web site does not have a high priority in the business strategy, and little time or money is spent on improving its appearance and functionality. The major purposes of the web site are to promote several functions that the winery hosts each year as a way of increasing visitors and cellar door sales as well as supporting the activities of the wine club.

With regard to the winery's use of external web sites, the winery does all of its banking online, and processes the wine export approvals online as well – both of these e-business processes are regarded as being more efficient and easier than the paper-based alternatives they have replaced. Government web sites are accessed frequently for up-to-date information relating to the wine industry and relevant workplace and industrial relations regulations.

4.2 Unit of analysis clarified as parent wine company

The unit of analysis for this research is the level of the winery organisation at which the e-business behaviour decisions and strategy is devised and managed – basically the winery management level. However in the case of the large wine companies which own several wineries and manage several very distinct brands it was not clear, prior to the interviews, whether all e-business decisions were made at the top corporate level or whether individual wineries under the same ownership had some level of autonomy in the area of their e-business usage. This point was clarified during the interviews when the relevant respondents made it clear that this level of decision making occurred at the corporate level and that very little autonomy existed for individual brand managers. Thus the unit of analysis for the survey stage was

clarified to be the parent wine company. Fortunately the ANZ Wine Directory includes relevant fields of information for company details where these are different to the individual winery name and contact details, making identification of wineries by their parent company a straightforward process.

4.3 Cross-case analysis of the interviews

The cross-case analysis explores the major themes which emerged from the rich information set contained in the interview transcripts. First, in section 4.3.1, it is shown how the collective data helped to identify the different e-business process domains which appeared to be the major areas of e-business activity within the wineries. This influenced the design and content of the survey instrument used for the next stage of the research. Second, two factors commonly cited in the interviews as influencing the e-business behaviour of the wineries are identified: 1) supply chain influence, discussed in section 4.3.2; and 2) the government influence, explored in section 4.3.3. Relevant comments from respondents are provided as illustration. Third, a brief discussion on the commonly raised barriers to further adoption and increased use of e-business processes is presented in section 4.3.4.

4.3.1 E-business process domains identified

All winery respondents indicated that e-mail is now extremely important within their winery operations. Collecting systematic data on which groups the wineries are communicating with via e-mail, and how the increased use of e-mail is altering former communication patterns will contribute to the main research question. Also, all winery respondents indicated that web sites belonging to external organisations are also frequently accessed for a range of purposes, with both industry and government sites cited. Use of external sites by wineries is predominantly B2B and hidden from public view. Gathering information on the types of sites that are being used will help to shed light on this important area of e-business activity.

The types of the wineries' web sites are summarised in Table 4-1. All wineries have a public web site; with some of the larger companies having several sites that are brand specific. The functionality of the public web sites varies between the wineries for a range of reasons which are examined in more detail in section 4.3.2.

Table 4-1 Summary of wineries' own web site activity

	Public web site	Online sales on public web site to consumers?	Online sales strategy influenced by business customers?	Intranet	Extranet
Winery 1	Multiple, brand specific	No	Yes	Yes	Yes
Winery 2	Multiple, brand specific	No	Yes	Yes	No
Winery 3	Yes	No	Yes	Yes	Yes
Winery 4	Yes	No	Yes	Yes	Yes
Winery 5	Yes	Yes	Yes – full retail prices to minimise conflict with existing distributor and retailers	Yes	No, but planned for future
Winery 6	Yes	Not relevant – almost all bulk sales to business customers	Not relevant	No	No
Winery 7	Yes	No	Yes	No	No
Winery 8	Yes	No	Yes	No	Yes
Winery 9	Yes	Yes	No	No	No

Intranets and extranets figured prominently in the e-business activities of a number of the interviewed wineries. Four wineries have an extranet, while a fifth winery indicated it planned to create an extranet site very soon. The extranet sites generally act as an information portal for trading partners and media groups with all offering self-service delivery of product information such as tasting notes and high quality graphic images. The Winery 1 respondent reported of their extranet site for business customers: *“in the first year that the site was live, that site delivered about 16,000 tasting notes and paid twice over for the development of the site.”* The Winery 8 respondent described the benefits of his winery’s extranet site as *“immeasurable, that’s the most useful asset we have as far as electronic medium is concerned.”* The major benefit cited was a marked reduction in the cost of supplying marketing information to business customers and media, but additionally the extranets provide greater control over the company’s marketing image by making access to approved

marketing material much easier, regardless of the location of the groups which needed the material.

Five of the nine wineries have an intranet. Intranets are largely used to improve internal communication and sharing of company information, and as a central distribution point for company policies, procedures and the forms used to document compliance. Winery 1 also uses their intranet to report performance of various sub-units against key performance indicators (KPI's), and in so doing increases the spread of *“information that is important to people in their day to day work”* throughout the company and delivers time saving benefits. The benefits of being able to publish information centrally from a single location and have all staff, regardless of their location, be able to access it immediately, is highly regarded. The Winery 5 respondent aims to *“remove the physical relationship between the user (internal staff) and corporate information. And I want to really replace that with a web based relationship because then physical location becomes irrelevant...It's just a far more fault tolerant environment to work in.”* Winery 2's respondent judged their intranet to have delivered the greatest benefit to the company thus far: *“the main benefit is with our people in the rural sector, the people at the wineries...they have the same access to information as we have, they would feel a lot closer to the business as a result...that's really empowered them in their profession”*.

In summary, on the basis of the interview findings, the major e-business process domains used by wineries were identified as 1) e-mail; 2) use of external web sites; 3) winery's public web site; 4) winery's extranet site; and 5) winery's intranet site. The inclusion of all of these process domains in the survey stage is justified as all were found to be considered important in the majority of wineries interviewed.

4.3.2 Supply chain influence on e-business behaviour

One consistent and common theme which emerged from the interviews was the influential role played by supply chain organisations on the e-business activity of the wineries. The supply chain influence appeared to manifest itself in a number of distinct ways, and these are now discussed.

First, those wineries with powerful business customers such as large retailers, for example Coles and Woolworths, are adopting EANnet in response to pressure from these customers. The four largest wineries of the interviewed wineries have either

started using, or are preparing to adopt EANnet as the direct result of pressure from large retailers. The wineries are responding to this pressure because they recognise that they must make it easy for major customers to do business with them, even if the relative advantage of the adoption lies largely with improving transactional efficiency and accuracy for the customers. The following comment from the Winery 3 respondent illustrates: *“Developing the software - there is a lot of time in that, the other place you get caught out 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.”*

The Winery 5 respondent, while not mentioning EANnet adoption, also recognises the need to provide access to electronic product data and product order details direct from internal databases to service major business customers and distributors better as an important survival strategy: *“it will get to the point where you’re dealing with a small number of distributors or large trade customers, the likes of your Woolworths or your Coles Myer, how can we make it easy for those businesses to do business with us as opposed to the competition...that’s our strategy, to deliver information electronically, it will position us at the top of our tier”*

Second, many of the wineries are also deliberately not offering online sales on wine to consumers in order to avoid creating conflict with their business customers and distributors. From Table 4-1 it can be seen that six of the nine wineries interviewed deliberately do not offer online sales of wine from their public web sites, with all six citing the need to avoid conflict with major business customers as the main reason for this decision. Of the three remaining wineries, Winery 6 does not offer online sales to consumers because the option does not fit into their business strategy as a bulk wine provider, while Winery 5 offers online sales of wine but deliberately charges full retail prices as a way of minimising conflict with their existing distributors and retailers. Only the smallest of the interviewed wineries, Winery 9, offers online sales of wine to consumers with no fear of pressure from major business customers to influence this decision. Thus, the fear of negative reaction from powerful business customers appears to be an important influential factor in determining the online sales strategy of seven of the nine interviewed wineries. 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.

Table 4-2 provides a range of comments from respondents about the influence of major business customers, and collectively these contribute powerful empirical evidence for the selection of supply chain influence as an important influential factor influencing e-business behaviour by wineries.

Table 4-2 Comments on influence of major retail customers in particular

Winery 1	“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”.....
Winery 2	“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.” “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 – no. No, we are not interested in that. In fact that actually tarnishes your brands and your reputation.”
Winery 3	“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.” “It can be a little bit tricky keeping everybody happy, especially some of our bigger customers like Woolworth’s and Coles because obviously we can offer the product cheaper than what they ever could. You don’t want to get in the way of anybody there - we could step on someone’s toes and not make them happy”
Winery 4	“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, and they want their DC’s to be able to order electronically to try and reduce the amount of paper.” “Well if we take an order off the consumer, we are actually undermining all the distribution channels out there, and as for the little retailer around the corner, what are we doing for him? We are actually taking business away from him aren’t we? Well it’s a little bit different for some of the smaller wineries who don’t distribute out through retail outlets, etc. They have a small cellar door, they just about sell everything that they make, and the Internet is just an extension of their cellar door. It’s a different distribution chain.”
Winery 5	“It will get down to the point where you’re dealing with a small number of distributors or large trade customers, the likes of your Woolworths or your Coles Myer, how can we make it easy for those business to do business with us as opposed to the competition? So if we can do things like provide the ability to see order status, to provide them with the ability to EDI into our systems and us into theirs, these produce efficiencies which make us an attractive option, because our size isn’t enough to justify necessarily keeping us on their shelves – OK - because we are not a large winery.”
Winery 6	“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”

Winery 7	<p>“..you (<i>consumer</i>) aren’t going to go and buy wine online (eg bottle of Shiraz) unless you know it or its on some very, very cheap special. And we (<i>winery</i>) can’t do that because then our retailers will get upset with us and say “You’re discounting against us, do you want me to sell it or do you want to sell it on the Internet? Make your choice.” And why would we discount our product that currently is selling in the retail outlets? Why would we discount? You would have to discount dramatically. There is only one word that we use in the industry; you would be prostituting your products. You wouldn’t do that.”</p>
Winery 8	<p>“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.”</p> <p>“30%-40% of business wineries are sold through Coles and Woolworths, and there are 1000 wineries all struggling because of that. If you decide to sell direct they will cut you out, and you better be committed to sell direct for ever.”</p>

Another theme which emerged from the interviews, also related to the influence of e-business behaviour by others in the supply chain, was that there was little point in raising the level of usage to a point that was out of step with others in the industry, particularly their suppliers and business customers with whom they have most transactions. Once again, this theme demonstrates that the actions and processes of other stakeholders in the industry supply chain are critical factors in influencing levels of e-business adoption by wineries. Table 4-3 includes examples of comments made during the interviews which relate to the perceived influence of others in the winery’s supply chain.

Table 4-3 Comments on influence of the supply chain in general

Winery 1	<p>“We cannot make decisions on how to use e-business in isolation - depends on what others are willing or capable of doing as well.”</p>
Winery 5	<p>“In talking to the distributors and trade customers that we get coming through the winery from time to time, I am convinced that if I can deliver on providing these customers with access to information that they need through the Internet and e-business, then within our tier it will be extremely unusual for wineries of our size to provide that information, so if I can do that, straight away it’s a positioned us at the top of that tier.”</p>
Winery 7	<p>“Apart from our own web site, our use of e-business is probably reliant more on what people we deal with do and don’t do, and whether they become more online, like government bodies like AWBC: like you can send through your (<i>wine export</i>) approvals, or expedite export documentation – that type of thing.”</p> <p>“We’ll adopt e-business if there are other parties that instigate it, whether they are an administrative body or whatever. If, for example, one of our chemical suppliers, which is probably our second largest commodity that we buy, the largest is grapes obviously, was to go online with ordering, then we would adopt it.”</p>

Winery 8	<p>“But it would have been a waste of money to spend too much too early, to expand too much and have too much electronic information available before the trade was ready for it.... the industry has to grow together in step.”</p> <p>“E-business will progress but it will have to progress in step with technology change and the nature of the retail market. But the consumers are probably more forward with it than the trade. Consumers are pretty comfortable with the internet but retailers just aren't yet, and you don't get too far ahead of your retailers!”</p>
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The need to move in step with others in the winery supply chain helps to explain the very low level of online procurement that exists within the interviewed wineries, with very few online interfaces currently provided by suppliers. Most respondents predicted that the lack of procurement activity is likely to remain much the same in the next few years, mainly because the wineries source their inputs from a very large and diverse range of suppliers who are unlikely to offer much in the way of online purchasing options. The diversity of inputs is seen as a strength of the industry, helping to guarantee that the wine-making process retains its current individualistic and artistic character. For example, wineries may spend significant amounts on purchasing wood for barrels, but the wood is likely to be purchased from a variety of sources around the world in order to meet the requirements of the different types of wine being made. Thus the opportunity for wineries to gain efficiencies through online procurement is at present very limited and this situation is unlikely to change within the next few years.

In summary, evidence of influence from supply chain organisations on the e-business activities of wineries from information gathered in the interviews indicates that this is an important explanatory factor which needs to be taken into account in improving our understanding of the nature and extent of e-business by wineries, and the reasons that account for that behaviour.

4.3.3 Government influence on e-business behaviour

Some of the wineries identified the activities of the Australian Government as being one of the factors driving some of their e-business behaviour. One major issue raised by a number of respondents was the forthcoming need for wineries to gain their export declarations from the Australian Customs Service using an online process after the new ICS system is finally operational. At the time of the interviews the expected implementation date for this change to occur was thought to be December 2003, and that use of the system would be mandatory. However the cutover date has

been delayed until October 2004, and use of the online interface will not be mandatory. A manual compliance alternative will be available, although it will have extra costs attached and require alternative evidence of identity procedures. No e-mail or fax options will be available. Awareness of this impending change 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 were seemingly unaware of the change. The respondent comments in Table 4-4 illustrate the lack of choice felt by the wineries with regard to this issue.

Table 4-4 Respondent comments on the impact of the new Customs system

Winery 1	<p>“Customs...have brought in an edict that you have to talk to them electronically by the end of September or you don’t export. 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.”</p> <p>“The way I would like to do it is to implement an XML converter in here and do a secure web transfer and use private key infrastructure... the value case for the capital expenditure request, we’ll be saying that this is a legislative requirement rather than cost saving, or time saving, or efficiency.”</p>
Winery 3	<p>“Australian Customs Service are putting in this new cargo tracking system which is why we have had to spend another \$40,000 to work with this one, and we have to do it, it is compulsory, and we have to have it in by November this year. But part of this system is they have an online function of looking after a cargo status, so it is a cargo tracking system.”</p>
Winery 5	<p>“We use a package called Trident, which is one of the packages that handles – 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. Customs are turning off Exit One because they are launching a new system, and the old ECN system of identification is being replaced with a new system. We went recently to a presentation by Customs where they outlined what they are proposing to do, and that will come into effect I think on the 1st of December (2003) from memory. There will be a two week hand over / take over period in which both systems will be in operation. After that the Exit One system will be turned off....but we already seeing that the systems – they are running behind schedule. We came out of that – this was 2 months ago - 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.”</p>

In the main, the respondents shared the view that the government was acting as a driver of e-business adoption by Australian businesses to some degree. Generally the benefits of adopting online processes were regarded favourably, with the Winery 4 respondent observing *“We see the improvements; we have decided we are going to go electronic with all the security in place. We are actually redesigning our whole export procedures and documentation systems around the Customs changes...you can save a significant amount of peoples’ time doing very dull and laborious jobs and give them the opportunity to do something which is a bit more exciting”*.

The influence of government activity on e-business use by wineries was evident in a number of other ways as well. Many of the wineries are adopting optional online compliance processes because they are viewed as easier to use and more efficient than the alternative manual processes. For example, six of the nine wineries were processing their wine export approvals online at the time of the interviews, while a further two were planning to adopt this approach in the near future. Improved communication and some online compliance is occurring with a range of government departments. For example, from Winery 6: *“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.”* The Winery 7 respondent provided another example: *“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.”*

For Winery 9, the smallest of the pilot study wineries, the government web sites are also proving to be beneficial as the following comments illustrate: *“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.”*

In summary, evidence of the influence of government activities on some of the e-business activities of the interviewed wineries indicates that it is a factor that helps to explain at least part of the nature and extent of their e-business use and contributes to an account of winery e-business behaviour. Investigation into the level of influence

from government activity felt by Australian wineries should provide an original contribution to research into factors influencing e-business adoption, as this is an area that has not yet been the subject of much research.

4.3.4 Barriers to e-business adoption or increased use

The subject of factors acting as barriers or limiters of e-business activity was covered in each interview. Respondents were asked to nominate the things which they felt acted as barriers, and their responses related to internet speed, costs, software standards, and data quality.

Limitations of the physical Telstra network appear to be a major barrier for many regional wineries. Telstra is the only network carrier with physical lines into all regional and remote sites. The quality of the lines away from the major cities and regional centres is relatively poor and does not support much in the way of e-business activity. For example, ADSL broadband connections are only available within approximately three and half kilometres of an ADSL enabled exchange (Telstra 2004), and many wineries are located outside this range. As the Winery 3 interview made clear, inferior internet access in regional areas is also accompanied by higher costs: regional businesses pay more to get less. Major infrastructure upgrade costs associated with upgrading internet access to acceptable speeds for supporting e-business are a burden for regional businesses. Thus many wineries in Australia are disadvantaged as a result of their rural location and inadequacies of Telstra's physical networks.

Cost of software development for e-business also emerged as a serious problem, even for the very large wine companies. The following comment from Winery 1 illustrates the problem: *“To get one interface set up had probably about a man year thrown at it over 3 months. You are talking over 40 interfaces on that scale; there is no way you can afford to throw out all the existing systems. All the costs around there (software development) are horrific. And as I say, they are without return when you have existing interfaces. If we were starting a company and starting from scratch, yep, you'd do it, but when you already have things in place it's not practical. The cost benefits aren't there.”* Thus the practical problem facing some – and possibly many – wineries is that the ideal solution of totally integrated enterprise wide databases with

standard XML interfaces is simply not going to be economically viable. Work-around solutions that convert data from one format to another are likely to be implemented in many cases, and legacy systems are likely to act as a limiting factor for years to come.

Software related barriers were also commonly raised by interview respondents. For example, several of the wineries identified the enterprise resource planning (ERP) system EZYwine as a barrier. While EZYwine provides many advantages on the one hand for wineries, on the other hand it also acts as a limitation for e-business activity because the software uses a closed, proprietary standard owned by Fox-Pro rather than an open standard that can be used to interface with the Web. The following quotation from the Winery 5 respondent illustrates the problem: *“...our ability to modify our core EZYwine system is extremely limited. Its database platform is quite closed, it’s not an open system, and that has been a big concern to me and it’s a risk factor for the company. I have had numerous discussions with the developers of the EZYwine system regarding migrating that system to a more open platform, and only last week did we reach a point where I thought that they were seriously considering taking up some of the points that I have been raising. And I think that that is happening because they are starting to hear the same story from other significant wineries, and significant customers, so they can now start to see that the world is changing.”*

Other software issues include problems with existing data in internal core systems not being of adequate accuracy and integrity to support automated e-business activities. Some respondents indicated that major efforts were now being made to stabilise and consolidate existing core commercial systems in readiness to be able to do more with e-business activities in the near future. Lack of confidence in the integrity of internal data was mentioned as a serious impediment to the immediate uptake of more e-business activities. Winery 4 respondent: *“Getting the data right, we could do it tomorrow, it’s just a matter of comfort. I could say today, yep, our data’s all correct, let’s just send it. But if it fails, as soon as you get a failure people tend to get put off. That is one of those things where it is no good having it 85% right, it has to be 100% right.”*

Respondents from the smaller wineries were also asked to comment on whether the complexity of e-business and lack of necessary technical expertise constituted a

barrier for them, as complexity is commonly raised as a barrier in the academic literature. However, complexity issues relating to technical knowledge, expertise, and Internet-related trust and risk concerns did not emerge as having any significant impact on e-business adoption decisions within the interviewed wineries. For example, Winery 8's comments: *"I'm sure it (e-business) is (complex) behind the scenes, but that's the same as my carburettor - it's a bit complicated, but it's not complicated for me"* and in answer to whether it constituted a barrier the reply was *"I don't think so, I think there is a million out of work IT guys out there at the moment, so that's not the problem. It's human behaviour and cost efficiency."* Winery 7's respondent also did not see the lack of in-house knowledge as a barrier to adoption as obtaining helpful advice from others expert in e-business was not difficult.

Collecting systematic data on a wide range of potential barriers to further e-business use by Australian wineries will contribute to understanding the current nature and extent of their e-business use. The interviews have helped to clarify the issues facing wineries in practice, and will influence the survey questions in this topic area.

4.4 Factors and Propositions

Taking the literature review and the findings from the pilot study into account, the four factors selected for further detailed study in the survey stage are: 1) relative advantage; 2) resource capacity; 3) supply chain influence; and 4) government influence. As discussed in sections 2.1.1 and 2.2.2, the first two of these factors are well recognised as important influences on adoption of innovations. However there is empirical evidence from the winery interviews that some winery e-business adoption is occurring despite there being no perception of direct relative advantage or obvious spare resource capacity – for example, the adoption of EANnet and online interfaces for Customs clearances, discussed in sections 4.3.2 and 4.3.3. Instead, in these cases, external factors such as the influence from supply chain organisations or government emerge as dominant reasons for the uptake of the e-business activity.

The identification of both the supply chain influence and government influence as possible factors in explaining e-business behaviour by wineries is an important outcome of the interviews, as neither factor was strongly identified in the literature review. Further research into the role of these factors in the survey stage should help

to make an original contribution to the understanding of e-business adoption behaviour by wineries. The inclusion of two factors which are already well recognised and accepted as having influence on adoption behaviour – relative advantage and resource capacity – will 1) increase the understanding of the role of these factors for winery e-business adoption, and 2) provide a useful point of comparison for the two newly identified factors.

Having decided on the selection of factors, four propositions are now developed.

Proposition 1

While all interviewed wineries were engaged in some level of e-business, there were some major differences between them, some of which appear to be related to the winery's size which in turn affects their market type and market place position. For example, only the very large and large wineries supplying to major business retailers have adopted or plan to adopt EANnet. Also, the larger wineries, with larger staff numbers and several offices spread across different geographic positions appear more likely to have an intranet site than do small wineries, with only the five largest interviewed wineries having intranets. One conclusion of this observation is that not all e-business processes are equally relevant for all wineries. There appears to be some systematic variation between the e-business processes of wineries that is related to their size. Thus, the first proposition, designed to investigate the relationships between winery size and the nature and extent of e-business activity, is now stated.

P1: The nature and extent of adoption of e-business processes by wineries will differ significantly between wineries in different size categories.

Proposition 2

Some of the e-business processes described by respondents were adopted largely because of the benefits they delivered – for example, e-mail, use of web sites for research and gathering relevant business information; while other processes were adopted because the wineries had little choice but to follow the directions of a more powerful external organisation - for example, adoption of EANnet is occurring to meet requirements of major business retailers, and wineries are now purchasing digital certificates and developing web interfaces for online Customs compliance as a

result of mandatory changes by the Australian Customs Service. The question of whether or not the winery has adequate resources to adopt online custom compliance has largely been taken out of their hands – if they want to continue to export, they have no choice in the matter. Thus, the impacts of factors which act as influences on e-business adoption behaviour appear to vary depending on the situation. The second proposition, designed to investigate the relationship between levels of influence of factors in different e-business process domains, is now stated.

P2: Factors influencing e-business adoption behaviour do not impact in the same way for different e-business process domains.

Proposition 3

Empirical evidence from the winery interviews, summarised in 4.3.2, suggests that the activities of supply chain organisations affect some of the e-business adoption behaviour by wineries. Thus, the third proposition is now stated.

P3: The nature and extent of adoption of e-business processes by wineries are influenced by the activities and perceived reactions of other organisations in the wineries' supply chain.

Proposition 4

Empirical evidence from the winery interviews, summarised in 4.3.3, suggests that actions of the government also affect winery e-business behaviour in certain areas as well. The fourth proposition is now stated.

P4: The nature and extent of adoption of e-business processes by wineries are influenced by the provision of government online services and online compliance processes.

4.5 Summary

The interviews proved to be a valuable part of the research discovery process. While e-business usage by the nine different wineries is quite variable, in all cases the usage was reported to be increasing steadily and gaining in importance. The impact in terms of process change and delivered benefits was generally reported to be greater

in the B2B area rather than in the B2C side of operations. Activity in B2G activities appeared to be on the increase with rising usage of online interfaces by various government bodies. Most interviewees anticipate that continued development and increased use in the areas of B2B and B2G will dominate their e-business activities in the next twelve to eighteen months.

While the perceived or expected degree of benefit delivered by the adoption of e-business processes drives much of the adoption, other factors appear to be the main driver in particular situations. Pressure from major business customers and from government appears to drive some of the e-business adoption in wineries – at least in the case of the large and very large wineries. The adoption levels appear also to be influenced by perceptions of available resource capacity. Thus, the four factors selected for further detailed investigation in the next stage of the research relate to the influence of relative advantage, winery resource capacity, supply chain activity, and government activity on the e-business adoption levels of wineries. The analysis of the survey data is reported next in chapter five.

5 Analysis of Survey Data

This chapter reports the analysis of the empirical data gathered via the self-administered questionnaire during the survey stage of the research. In section 5.1 the respondents are described in terms of their finite population proportions for various winery size categories, and response bias issues are also considered. Further demographic data on the respondents in section 5.2 is followed by analysis of the nature and extent of e-business adoption in section 5.3 and potential barriers to further adoption in section 5.4. Propositions developed after the literature review and the pilot study are then tested against the collected data in section 5.5. The additional comments from respondents are summarised in section 5.6, and these are followed by a chapter summary in section 5.7. The survey form is available as Appendix E, while an annotated copy of the survey form with the number of responses to each question is provided as Appendix F. The complete list of respondent comments is available in Appendix G.

5.1 Survey respondents

The questionnaire was sent to the entire population of Australian wineries processing more than 20 tonnes of grapes annually, with the winery listing from the electronic version of the 2003 ANZ Wine Industry Directory (Winetitles 2003a) used as the defined, finite population. Within this directory, the wineries are categorised into various industry standard size ranges based upon the annual tonnage of grapes crushed. Of the 1065 questionnaires sent out, three undeliverable envelopes were returned while 201 completed questionnaires were returned. A further five responses were received from winery organisations with the following reasons for not participating in this survey:

- three were not wineries: two were vineyards only, with one in the 50-99 tonnage range and the other in the 100-249 tonnage range; while one in the 20-49 tonnage range was mainly a logging company;
- one winery in the 100-249 tonnage range had been liquidated and was no longer trading;
- one winery in the 20 000 and over tonnage range reported that it was against company policy to participate in surveys.

Of the 201 completed responses, three were deemed unusable due to unreliable responses, with the same level of agreement ticked for nearly all statements regardless of whether they provided contradictory answers or not. There was one unusable response in each of the following tonnage ranges: 20-49, 50-99 and 100-249. Only the 198 usable responses were used for data analysis purposes. Table 5-1 lists the number of questionnaires sent out for each size range by annual tonnage of processed grapes, as well as the number of completed and usable returns in each size range. The final response rate from the census survey was 18.6%.

Table 5-1 Usable response numbers from winery population

Annual Tonnage Range	Number in Population in 2003	Population %	Number of Responses	Responses as % of Population in Range	Responses as % of Total Responses
20-49	379	35.6%	50	13.2%	25.3%
50-99	226	21.2%	39	17.3%	19.7%
100-249	196	18.4%	31	15.8%	15.7%
250-499	96	9.0%	17	17.7%	8.6%
500-999	54	5.1%	18	33.3%	9.1%
1000-2499	45	4.2%	13	28.9%	6.6%
2500-4999	26	2.4%	11	42.3%	5.6%
5000-9999	17	1.6%	7	41.2%	3.5%
10000-19999	13	1.2%	5	38.5%	2.5%
20000 and over	13	1.2%	7	53.8%	3.5%
Total	1065	100%	198		100%
Survey Response %			18.6%		

The response rate for the wineries with annual tonnage ranges of greater than 500 tonnes is significantly different to the response rates for the smaller wineries ($\chi^2(9) = 40.19, p < 0.001$) and generally the return rate of surveys increases as the winery size increases. See Table 5-1 for the actual percentages. The relatively high response rates of 30% to 50% from these larger organisations are particularly important for this research as it is these wineries that account for the bulk of the wine economy and business activity.

5.1.1 Winery sizes – small, medium, large and very large

Winery size, to some extent, determines a winery's market focus and market position (ACIL 2002), and therefore size is likely to act as a moderating factor on a range of e-business behaviours. For analysis purposes the wineries are grouped into fewer size categories than the industry standard tonnage ranges in order to make it easier to

compare characteristics and e-business usage behaviour between the different sizes. However the new size categories are still based on annual tonnage ranges, and build on a system of size categorisation used by other analysts. ACIL Consulting, while acknowledging that no definition of what constitutes a small or medium winery can be perfect, developed the following four-stage classification for use in their report entitled 'Pathways to profitability for small and medium wineries' (ACIL 2002):

- Micro – processing less than 20 tonnes annually;
- Small – processing between 20 and 249 tonnes annually;
- Medium - processing between 250 and 999 tonnes annually; and
- Large – processing more than 1 000 tonnes annually.

Given that the focus of this study was small and medium sized wineries, the decision to include all larger wineries in a single group did not affect the outcomes. These size ranges were also used by Sellitto and Martin (2001) in their research into e-business adoption by Victorian wineries, discussed in chapter two.

For the purpose of this research, the size categories were modified by adding an extra category for very large wineries that process 10 000 tonnes or more annually. This was done in order to differentiate this group from the other large wineries due to the sheer dominance of the top 20 or so wineries of the Australian wine industry. Note however that the tonnage range covered by the very large size category is extremely large and open-ended, with only the lower bound of 10 000 tonnes prescribed. In 2002 for example, BRL Hardy processed over 270 000 tonnes while Orlando Wyndham processed over 160 000 tonnes (Winetitles 2003a, p. 21). The top five wine companies – Southcorp Wines, BRL Hardy, Orlando Wyndham, Beringer Blass and McGuigan Simeon Wines – are said to dominate the industry, with Southcorp Wines and BRL Hardy alone accounting for nearly half the sales of branded wine (Winetitles 2003b). Thus the very large category, while only having 26 members, covers a much wider range of size by tonnage processed than the other size categories.

As micro size wineries are not included in this research the micro category was dropped, resulting in a four-stage classification system, developed for this research, of small, medium, large and very large as follows:

- Small – processing between 20 and 249 tonnes annually;
- Medium - processing between 250 and 999 tonnes annually;
- Large – processing between 1 000 and 9 999 tonnes annually; and
- Very Large – processing more than 10 000 tonnes annually.

Table 5-2 summarises the population and response numbers using these size categories. The original variable holding the responses on tonnage range was recoded into a different variable to generate the new variable of winery size category. The increase in proportion of responses from wineries as the winery size increases is self-evident from Table 5-2, and the difference is significant ($\chi^2(3) = 32.28, p < .001$).

Table 5-2 Winery size categories, population and response numbers

Winery Size Category	Annual Tonnage Range	Number in Population	Population %	Number of Responses	Responses as % of Population in Range	Responses as % of Total Responses
Small	20-249	801	75.7%	120	15.0%	60.6%
Medium	250-999	150	14.2%	35	23.3%	17.7%
Large	1000-9999	88	8.3%	31	35.2%	15.7%
Very Large	10000 and over	26	2.5%	12	46.2%	6.1%

5.1.2 Response bias

Response bias check between early and late respondents

Of the 198 usable responses, 189 were received with no follow-up. Armstrong and Overton (1977) suggest that late responses indicate a decreased readiness to respond and therefore late respondents are possibly more like the non-respondents. Accordingly, the early and late responses are compared for differences using the date of the survey response receipt for a time-trend extrapolation (Armstrong & Overton 1977). Early respondents were judged to be the first 75% of responses (143) received between 27-Oct-2003 and 7-Nov-2003; the remaining 25% (46) were judged as late, and were received between 10-Nov-2003 and 15-Dec-2003. All nominal variables were tested for significant difference between the early and late responses using chi-square tests, and all ordinal variables were tested for significant difference between the early and late responses using the Kruskal-Wallis K Independent Sample tests. Only 2% of all 150 variables tested showed a significant difference ($p < 0.05$) between

early and late responses, which provides evidence that there is no bias between the early and late responses at the 95% confidence level.

Pro-response bias from wineries with internet access

Of the 198 usable responses, only three small wineries did not have internet access. The 195 responding wineries with internet access represents 98.5% of all respondents. This high percentage suggests that there may be a pro-response bias from wineries who have adopted some level of e-business activity compared with those wineries that have not adopted e-business.

The electronic version of the 2003 ANZ Winery Directory does not include an e-mail address field, which is unfortunate insofar as this would have acted as a useful surrogate variable for showing wineries' internet access status. However, the electronic directory does include a URL field for each winery's B2C web-site address, and of the 697 wineries listed with a web-site, 21% of these (147) responded to the survey, whilst of the 368 wineries without a web-site address listed, only 13.8% (51) responded. The response difference between the observed and expected respondents with or without a URL is significant ($\chi^2(1) = 8.3, p < 0.005$), and indicates that wineries with web sites were more likely to respond to the survey than wineries without web sites. This evidence of a pro-response bias from wineries with a URL provides support for the conjecture that those wineries engaged in some level of e-business activity were more likely to complete the questionnaire than those who have not adopted e-business practices at all.

5.2 Background winery information - respondent profiles

The background winery information collected from section one of the questionnaire is summarised next, with the corresponding question number provided for cross-checking purposes.

Ownership Structure – Survey Question 1.1

Most of the wineries are privately owned, as the responses summarised in Table 5-3 indicate. One response was missing. One respondent indicated the winery was owned by a group of investors, while another winery respondent indicated that they were owned by an overseas company. However, the likelihood of public ownership

occurring in the large and very large wineries is much higher than for small and medium wineries, with one in five of the large wineries and one in three of the very large wineries reported to be public companies.

Table 5-3 Ownership type and winery size

Winery size	Privately owned	Public company	Other	Total
Small	117	2	0	119
Medium	34	0	1	35
Large	25	5	1	31
Very Large	9	3	0	12
Total	185	10	2	197

Year when winery was first established - Survey Question 1.2

The year of each winery's establishment was requested in order to find out if there are any significant associations between a winery's age and their size or e-business activity. While the exact year in which the business was established is common knowledge in many wineries, for other wineries the information is imprecise – either due to mergers, take-overs, or simply through lack of knowledge of company history. Fourteen respondents did not supply this information. The year of establishment provided by the remaining 184 respondents ranged from 1842 to 2003 - the year in which the survey was conducted. This range represents a difference of 162 years between the oldest and youngest winery organisations.

The wineries were grouped into six age categories using a logarithmic scale in order to usefully distinguish between the younger wineries using a finer age scale than that used for the older wineries. The age groupings are: 0-4, 5-9, 10-24, 25-49, 50-99, and 100+ years old. Table 5-4 shows the distribution of winery ages for each winery size.

Table 5-4 Winery ages by winery size

Winery Size	Age in years						Total
	0-4	5-9	10-24	25-49	50-99	100+	
Small	13	29	45	19	2	1	109
Medium	6	8	10	8	0	3	35
Large	3	7	6	6	3	4	29
Very Large	0	4	2	3	0	2	11
Total	22	48	63	36	5	10	184

A Kruskal-Wallis K Independent Sample test showed no significant difference in the distribution of winery sizes for the different ages ($\chi^2(3)=4.8$, $p >0.1$, $N = 184$), indicating that analysis of responses by age are not required.

Figure 5-1 illustrates that most respondent wineries have been established in business for over five years and cannot be considered to be new entrants into the industry.

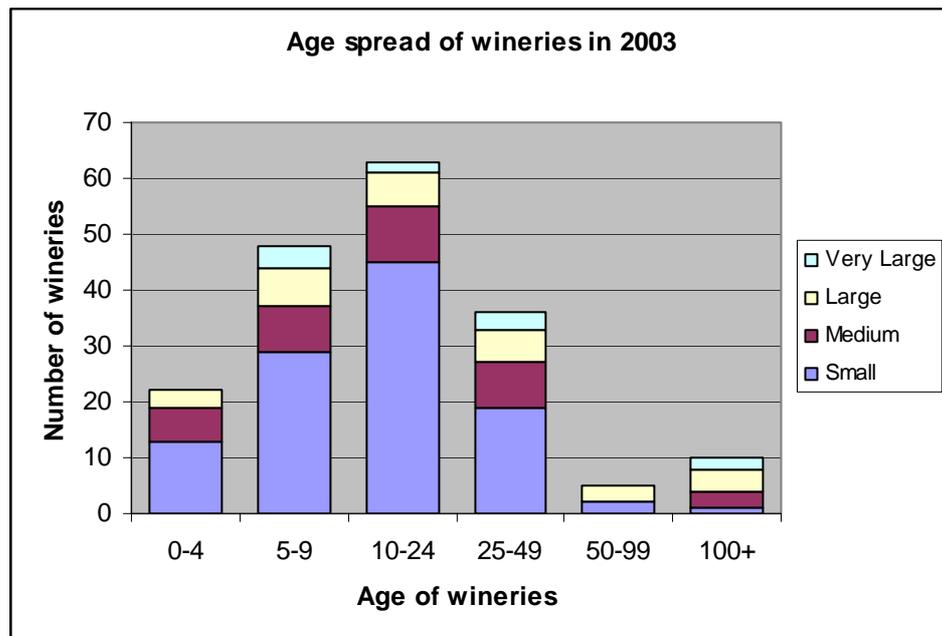


Figure 5-1 Distribution of winery ages on a logarithmic scale

Full time staff reported to be employed by the wineries - Survey Question 1.4

A high percentage of wineries operate with very small full-time staff numbers, with 142 of the 196 wineries - almost three quarters (72.4%) - indicating that they have ten or less staff. The staffing levels also vary widely within each and between the large and very large size categories. This is not surprising, particularly because of the high variance in size within the very large category which ranges from ten thousand tonnes to hundreds of thousands of tonnes as discussed in section 5.1.1. The wide variance within the staffing levels of the very large wineries in particular, ranging from as low as 11-20 to more than 1000 staff, suggests that the nature of the business operations and market focus of organisations within this category are also likely to vary markedly. ACIL Consulting demonstrated that a relationship exists between a winery's size and their market focus (ACIL 2002). Table 5-5 summarises the staffing levels of the respondent wineries.

Table 5-5 Full-time staff numbers for each winery size

Winery size	0-10	11-20	21-50	51-100	101-250	251-500	501-1000	>1000
Small	116	3	0	0	0	0	0	0
Medium	18	12	5	0	0	0	0	0
Large	8	4	14	3	1	0	0	0
Very Large	0	2	3	2	3	0	1	1
Total	142	21	22	5	4	0	1	1

The state locations of the responding wineries – Survey Question 1.5

The response rate from the wine producing states was reasonably consistent, although the response rates from wineries in South Australia and Tasmania were higher than the other states, as shown in Table 5-6. Victoria, New South Wales and South Australia have the greatest concentrations of the very large wine companies, and this is reflected in the distribution of responses. While it is not expected that the state location will have a significant bearing on e-business adoption practices, the data does illustrate that there is a good spread of responses from all wine producing states, and hence this survey can claim to be national.

Table 5-6 Respondents by winery size and state locations

Winery size	Vic	SA	NSW	Qld	WA	Tas
Small	34	33	27	7	13	6
Medium	3	18	6	1	7	0
Large	5	9	7	1	9	0
Very Large	5	5	4	0	1	0
Responses	47	65	44	9	30	6
% of State	17%	24%	16%	18%	15%	25%

Exports as a percentage of total annual wine production – Survey Question 1.6

The percentage of annual wine production exported by the respondent wineries is summarised in Table 5-7. The difference in responses to this question by winery size is highly significant ($\chi^2(3) = 42.69, p < .001, N = 197$).

Table 5-7 Percentage of annual production exported by winery size

Winery size	No exports		Exports < 25%		Exports between 25 - 50%		Exports > 50%		Total
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage	
Small	48	40.0%	44	36.7%	17	14.2%	11	9.2%	120
Medium	1	2.9%	13	38.2%	14	41.2%	6	17.6%	34
Large	1	3.2%	14	45.2%	9	29.0%	7	22.6%	31
Very Large	1	8.3%	0	0.0%	4	33.3%	7	58.3%	12
Total	51		71		44		31		197

Figure 5-2 illustrates the trends in exporting behaviour by winery size. Small wineries are less likely to be involved in exporting than larger wineries, and the percentage of small wineries rapidly declines as the export percentage increases. The vast majority (~97%) of medium and large wineries do export, but only about one in five export more than half of their annual production. However, 58% of the very large wineries export more than half of their annual production of wine. Therefore, the data shows that the larger a winery, the more likely it is to have a greater percentage of exports.

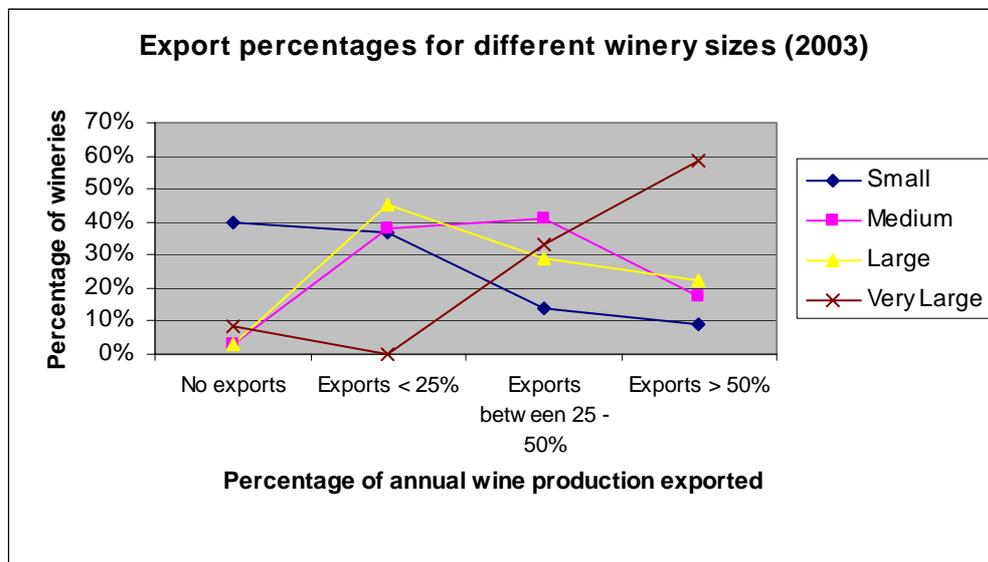


Figure 5-2 Winery numbers for each export percentage category by winery size

Internet access capability of wineries – Survey Question 1.7

Of the 198 respondents, 195 indicated they have internet access. The three wineries with no access to the Internet were all small, and they provided the following information:

- NSW, exports less than 25% of annual production, with barriers including the cost of adequate connection to physical networks, limitations of connection speeds, internal data not in an appropriate format for Internet access, cost/benefit analysis not judged as favourable, lack of e-business activity by customers, and a cautious approach to using the Internet.
- NSW, no exports, and the comment “Illiterate myself, will wait for next generation” indicating lack of knowledge as the major barrier.
- SA, exports more than 50%, and the comment “Owner hasn’t used one and doesn’t plan on using one”, indicating that the lack of managerial support is the major barrier to future adoption.

Length of time of internet access – Survey Question 1.8

Respondents with internet access (195 cases) were asked to report on the approximate number of years their winery has had Internet access as a general indicator of exposure to the technology. Response times ranged from six months to fifteen years, and the responses are presented in summary format in Table 5-8. The data illustrates that most of the responding wineries have had access to the Internet for business purposes for several years, with the majority in the three to ten year range. There is no significant difference in the responses with regard to winery size.

Table 5-8 Number of years wineries have had Internet access

Winery Size	1 year or less	2 years	Between 3 and 4 years	Between 5 and 10 years	More than 10 years	Total
Small	7	11	37	50	4	109
Medium	0	5	9	16	2	32
Large	1	2	12	12	1	28
Very Large	0	0	6	6	0	12
(Missing)						14
Total	8	18	64	84	7	195

Summary of background winery information

The census survey response shows relatively high response rates from the large and very large wineries in particular, and demonstrates that the objective of a national survey has been achieved. The fact that nearly all of the respondents have internet access aids this research into gaining an understanding of how e-business is being used by Australian wineries. Their responses to sections 2-7 of the survey, investigating the e-business activities of wineries, are summarised next.

5.3 The nature and extent of e-business use by wineries

Responses to the survey questions for each e-business process domain are summarised next in order to develop a detailed description of the nature and extent of e-business use by the wineries. Responses to the factor statements are not included in this section. Where statistically significant differences of at least $p < 0.05$ exist between the responses by respondent's winery size, the results are reported by winery size, and the significance is reported. Pearson Chi-square tests are used for nominal data, while Kruskal-Wallis K Independent Sample tests are used for ordinal data. Where expected frequencies in contingency tables are less than the required expected count of 5 or more per cell, the significance levels of Fisher's Exact Test (using SPSS 11.5) were compared with Pearson Chi-square values: no cases of non-equivalence were found, and thus for consistency Pearson Chi-square test results are reported in all cases.

5.3.1 Business use of e-mail

Responses to questions relating to the nature and extent of the e-mail process domain from section two of the questionnaire are now summarised. Nearly all respondents with internet access use e-mail - 192 from 195. The following statistical summaries are based on the 192 respondent wineries using e-mail.

Groups that wineries communicate with using e-mail – Survey Question 2.2

In order to get a picture of the nature and extent of e-mail use by wineries, data was gathered on the identity of the various groups with which the wineries communicate via e-mail. Respondents were asked to tick as many groups as applied. The responses are displayed in Table 5-9 in descending order of frequency from left to right. Little difference exists between the number of wineries that communicate with the top four

groups of wine industry associations, business customers, suppliers, and individual customers - approximately seven in every eight wineries use e-mail to communicate with these B2B and B2C groups. However there is a weak but significant difference by winery size between the responses with regard to e-mail use with both wine industry associations ($\chi^2(3)=9.36$, $p<.05$, $N=192$) and with suppliers ($\chi^2(3)=8.26$, $p<.05$, $N=192$): in these two cases the frequency tends to increase as the winery size increases.

Table 5-9 Groups that wineries communicate with using e-mail

Winery Size	Wine Industry Associations		Business Customers		Suppliers		Individual Customers		Gov't agencies & dept's		Marketing/Press		Business Partners		Internal Staff		Total Number
Small	93	82%	94	82%	92	81%	99	87%	79	69%	77	68%	56	49%	36	32%	114
Medium	34	97%	33	94%	33	94%	30	86%	28	80%	31	89%	25	71%	23	66%	35
Large	29	94%	29	94%	29	94%	27	87%	28	90%	26	84%	28	90%	28	90%	31
Very Large	12	100%	11	92%	12	100%	10	83%	10	83%	9	75%	11	92%	12	100%	12
Total	168	88%	167	87%	166	86%	166	86%	145	76%	143	74%	120	63%	99	52%	192
$\chi^2(3)$	9.38				8.26						7.98		24.48		50.95		
<i>p</i> -value	0.025				0.041						0.046		0.000		0.000		

On average about three-quarters of the respondents use e-mail to communicate with the next two most frequent groups: government and marketing/press. There is little significant difference by winery size between the responses for these two groups, with only a weak difference detected by winery size for e-mails with the marketing/press groups. However, a highly significant difference exists between the responses of the different size wineries for the last two groups of business partners ($\chi^2(3)=24.48$, $p<.01$, $N=192$) and internal staff ($\chi^2(3)=50.95$, $p<.05$, $N=192$): larger wineries are much more likely to use e-mail to communicate with business partners and their own internal staff than are the smaller wineries.

Given the general trend of increasing e-mail use with increasing winery size, and the fact that there is a far greater likelihood that large and very large wineries use e-mail with business partners and with winery staff, it follows that the extent of e-mail use also increases with winery size. Figure 5-3 illustrates this by comparing the number of groups that each winery size communicates with via e-mail. For e-mail use with all eight groups the differences are particularly noticeable: less than 20% for small

wineries; 30% for medium wineries, 60% for large wineries and 75% for the very large wineries.

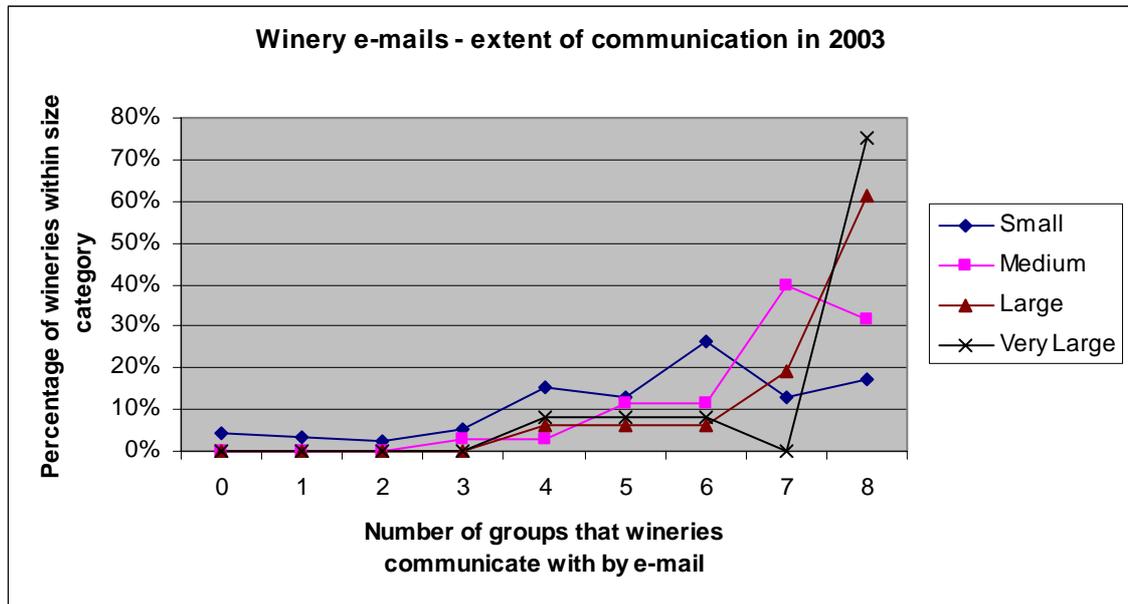


Figure 5-3 Extent of communication measured by the number of groups wineries communicate with via e-mail

In summary, wineries use e-mail to communicate with a broad range of groups within their supply and value chains; and the larger the winery the more likely it is to use e-mail, particularly for supporting internal relationships with their own staff and business partners.

E-mail as a replacement for other communication mediums – Survey Question 2.3

Respondents were asked to indicate if e-mail was increasingly being used to replace letters, faxes, telephone calls or face to face communication within the business: only the responses to the telephone option show no significant difference by winery size. Table 5-10 reports the responses. The replacement of face-to-face communication with e-mails shows the strongest evidence of a difference by winery size ($\chi^2(3)=11.0$, $p<.05$, $N=192$), with the trend increasing as winery size increases. This supports the finding from the responses to question 2.2 reported above – larger wineries use e-mail for internal communication more than smaller wineries.

Faxes are being replaced by e-mail more than the other communication types – this trend is less so among the small wineries, but even among this group the likelihood is still high: just over 80% of small wineries reported using e-mails instead of faxes

compared with almost all larger wineries. Letters are also being used less in favour of e-mails, with the percentage of responses from the small and very large wineries both near 80%, while 90% of medium and 100% large winery respondents reported a drop in letter use in preference to e-mails. E-mails are also replacing telephone calls in most wineries, with this trend increasing as winery size increases.

Table 5-10 Impact of e-mail as a replacement communication medium

Winery Size	Winery numbers using email to replace								Total Number
	Faxes		Letters		Telephone		Face to Face		
Small	95	83%	89	78%	67	59%	28	25%	114
Medium	34	97%	31	89%	23	66%	11	31%	35
Large	30	97%	31	100%	24	77%	13	42%	31
Very Large	12	100%	10	83%	10	83%	8	67%	12
Total	171	89%	161	84%	124	65%	60	31%	192
$\chi^2(3)$	9.55		9.4				11.0		
<i>p</i> -value	0.023		0.025				0.012		

The change in volume of e-mail use over the last 12 months - Survey Question 2.4

Responses to the survey were received over a two-month period ranging from 27/10/2003 to 18/12/2003. Respondents were asked to estimate the change in volume of business e-mail over the previous 12 month period. Three respondents did not provide an answer to this question, giving 189 valid answers. The five options and the responses are summarised in Table 5-11. A Kruskal-Wallis K Independent Sample test provides evidence that the change in volume of e-mail differs significantly by winery size ($\chi^2(3) = 13.9$, $p < .01$, $N=189$). Only one small winery respondent indicated a decrease in use of e-mail while of the 17 responses indicating they had experienced no change, 16 were from small wineries.

The remaining 90% of wineries indicated that their volume of e-mail usage had increased over the previous 12 month period. A slight increase refers to an increase of less than 25%, a moderate increase refers to an increase of between 25 and 100%, while a high increase is defined as more than double. Almost one third of respondents judged there had been a slight increase; a further 44% judged there had been a moderate increase; while the remaining 14% indicated that the business had experienced a high increase in e-mail volumes.

Table 5-11 Change in volume of business e-mail use by wineries over 12 month period from late 2002 until late 2003

Winery Size	Decreasing		No change		Slight increase (<25%)		Moderate increase (25-100%)		High increase (> double)		Total
Small	1	1%	16	14%	41	36%	43	38%	12	11%	113
Medium	0	0%	0	0%	10	29%	18	51%	7	20%	35
Large	0	0%	1	3%	5	17%	17	59%	6	21%	29
Very Large	0	0%	0	0%	5	42%	5	42%	2	17%	12
Total	1	1%	17	9%	61	32%	83	44%	27	14%	189

Only the small wineries show a sizeable proportion of 15% not experiencing a growth in e-mail usage; of these over half are in the smallest tonnage range of 20-49. In general, business use of e-mail by wineries is increasing, with more than half of all wineries indicating they have experienced either a moderate or high change in volume over a one year period.

Estimation of importance of e-mail to the wineries’ business – Survey Question 2.5

Respondents were asked to estimate how important they felt that e-mail was to their winery’s business, with choices ranging from: 1=not at all; 2=not very important; 3=moderately important; 4=very important; and 5=extremely important. A Kruskal-Wallis K Independent Sample test provides evidence that the responses are significantly different by winery size ($\chi^2(3) = 11.89, p < 0.01, N=191$). Table 5-12 reports the results. All respondents from medium, large and very large wineries agree that e-mail is important. There is little difference between the responses from the large and very large wineries, with over 80% of respondents from these groups indicating e-mail was either very or extremely important, while for medium wineries the figure is 75%. The respondents from small wineries provide the point of difference – 12% felt e-mail was not very important, and only 60% felt it was either very or extremely important. Thus, e-mail is, on average, less important for small wineries than larger wineries.

Table 5-12 Estimates of the importance of e-mail to the winery's business

Winery Size	Not at all important		Not very important		Moderately important		very important		extremely important		Total	Mean importance
Small			14	12%	33	29%	44	39%	22	19%	113	3.65
Medium			0	0%	9	26%	16	46%	10	29%	35	4.02
Large			0	0%	5	16%	15	48%	11	35%	31	4.19
Very Large			0	0%	2	17%	6	50%	4	33%	12	4.16
Total	0	0%	14	7%	49	26%	81	42%	47	25%	191	3.84

5.3.2 Business use of external web sites

Analysis of the responses to the questions relating to the business use of external web sites by wineries uses the 195 cases where internet access is available.

Reasons for using the web – Survey Question 3.1

Provided with eight possible reasons for using the Web, respondents were asked to select all of those that applied to their winery, and to specify additional reasons as appropriate. The responses are shown in Table 5-13, listed in decreasing order of the total response frequency. The most common external web sites accessed by wineries are the wine industry web sites (e.g. the Australian Wine and Brandy Corporation site). Almost 90% of wineries use the internet to access wine industry web sites, with no significant difference in this usage between wineries of different size. The next most common type of web sites accessed by wineries are government sites with usage differing significantly by winery size: for example, 72% of small wineries compared with 100% of very large wineries ($\chi^2(3) = 11.88, p < .01, N = 155$).

Almost 80% of respondents report using the web for business research, with no statistically significant difference by winery size. However, when it comes to investigating products and suppliers there is a difference between winery sizes: just over 60% of small wineries use the web for this reason compared to approximately 90% for the larger wineries ($\chi^2(3) = 15.58, p < .01, N = 142$). Using the Web to transact online with business partners such as bottling companies and freight companies differs significantly by winery size with the likelihood increasing as winery size increases: ranging from 44% of small to 75% of very large wineries ($\chi^2(3) = 8.99, p < .05, N = 101$). There is a similar trend of increasing use with increasing size for

investigating distributors, agents and wholesalers, but the difference in this case is not significant.

Table 5-13 Reasons for wineries to use the Web

Reason	Winery size	N=195		$\chi^2(3)$	p-value
Access wine industry sites and information	All	172	88%		
Access Government sites and online services	Small	84	72%	11.88	0.008
	Medium	33	94%		
	Large	26	84%		
	Very large	12	100%		
	TOTAL	155	79%		
Research for your business	All	153	78%		
Investigate suppliers and/or products	Small	73	62%	15.58	0.001
	Medium	31	89%		
	Large	27	87%		
	Very large	11	92%		
	TOTAL	142	73%		
Transact online with business partners	Small	51	44%	8.99	0.029
	Medium	20	57%		
	Large	21	68%		
	Very large	9	75%		
	TOTAL	101	52%		
Investigate distributors / agents / wholesalers	All	98	50%		
		N=144 (Excludes non-exporters)			
Apply for wine export approvals online	Small	31	45%	15.92	0.001
	Medium	14	41%		
	Large	23	77%		
	Very large	8	73%		
	TOTAL	76	53%		
Apply for Customs clearance online	Small	10	14%	15.79	0.001
	Medium	5	15%		
	Large	9	30%		
	Very large	7	64%		
	TOTAL	31	22%		

The 51 wineries, identified in Table 5-7 as having no exports, are excluded from the analysis for the two export-related reasons to use the web, reducing the number of possible cases from 195 to 144. For the exporting wineries, approximately 45% of the small and medium wineries use the online compliance process for wine export approvals compared with approximately 75% of the large and very large wineries, a significant difference in usage level ($\chi^2(3) = 15.92, p < .01, N=76$). The same type of pattern is observed for wineries using the Web to process customs clearances, with only about 15% of small and medium wineries using this option, except that in this

case the usage levels of very large wineries, at 64%, is markedly higher than that of the large wineries at 30%. The difference by winery size for online custom compliance is significant ($\chi^2(3) = 15.79, p < .01, N=31$).

Twelve respondents included additional reasons for using the Web: these included conducting travel bookings, sales, banking, and sourcing artwork and machinery. One very large winery respondent indicated that work was in progress to use the Web for processing exports and customs clearances in the near future.

Digital certificates – Survey Question 3.2

Respondents were asked to indicate if their winery had purchased a digital certificate, or if they planned to do so in the near future, in order to gauge the wineries' level of readiness to adopt e-business practices that require evidence of identity for increased trust and security purposes. Three responses were missing; 39 respondents did not know whether the winery had a digital certificate or not; 131 responded 'no'; while 22 responded 'yes'. A chi-square test by winery size on the yes/no responses shows a significant difference by winery size ($\chi^2(3) = 17.02, p < .01, N=153$). See Table 5-14 for responses by winery size.

Table 5-14 Yes/no responses for wineries with digital certificates

Digital Certificate	No		Yes		$\chi^2(3)$	p-value
Small	92	92%	8	8%		
Medium	19	79%	5	21%		
Large	16	80%	4	20%		
Very large	4	44%	5	56%		
TOTAL	131	86%	22	14%		

The proportionate distribution of those wineries with digital certificates is heavily weighted towards the very large wineries, with less than 10% of small wineries yet to purchase one. The general trend emerging is that the larger the winery the greater the likelihood that they have a digital certificate.

Online banking percentage – Survey Question 3.3

Most wineries are now using the Internet to some degree for banking, with 84% of all respondents indicating their winery uses online banking. The degree of usage does vary by winery size however ($\chi^2(9) = 21.3, p < .05, N=188$). A greater percentage of

very large wineries use online banking for most banking needs compared with the smaller wineries; while the likelihood of not using online banking is greater as winery size decreases. Five respondents indicated they did not know this information, while two responses were missing. See Table 5-15 for the usage numbers and percentages by winery size.

Table 5-15 Winery banking percentages by winery size

Winery size	No banking		<25%		25-50%		>50%		Total	$\chi^2(9)$	p-value
Small	24	21%	38	33%	15	13%	38	33%	115		
Medium	5	15%	5	15%	8	24%	16	47%	34		
Large	2	7%	7	25%	11	39%	8	29%	28		
Very Large	0	0%	3	27%	1	9%	7	64%	11		
TOTAL	31	16%	53	28%	35	19%	69	37%	188		

Use of electronic product catalogue systems – Survey Questions 3.4 & 3.5

Respondents were asked to report on whether or not their winery is using an electronic product catalogue system such as EANnet to hold wine product data for access by business customers. Forty-seven respondents did not know the answer and one response was missing. Most wineries are not making their product data available to business customers via an online product catalogue with 108 ‘no’ responses. However there were 39 ‘yes’ responses, with the responses differing significantly by winery size: the likelihood of using an electronic product catalogue increases with winery size ($\chi^2(3) = 14.96, p < .01, N=147$). See Table 5-16 for the responses.

Table 5-16 Online product catalogue use by winery size

Use an electronic product catalogue	No		Yes		$\chi^2(3)$	p-value
Small	75	82%	16	18%		
Medium	17	74%	6	26%		
Large	13	52%	12	48%		
Very large	3	37%	5	63%		
TOTAL	108	73%	39	27%		

In order to investigate if pressure from major customers influenced the adoption of the online product catalogue system, the ‘yes’ respondents were also asked to indicate if the adoption had occurred to meet requirements of major retail customers.

Of the 39 respondents indicating yes, 24 indicated that the decision to adopt the electronic product catalogue system was driven by the requirements of their major retail customers. Table 5-17 shows the division of the yes responses by winery size. While there is no statistically significant difference by winery size for $p < .05$, only in the very large size category are all respondents using an online product catalogue to meet customer requirements.

Table 5-17 Adoption of online product catalogue due to business customer pressure

Pressure from business customers	Online Catalogue Users	Yes	
		Count	Percentage
Small	16	9	56%
Medium	6	3	50%
Large	12	7	58%
Very large	5	5	100%
TOTAL	39	24	62%

5.3.3 Winery public web site – business to customer

Of the 195 wineries with internet access, 155 of them - almost 80% - have a public web site while 40 wineries do not. Only the 155 respondents with publicly accessible web sites are included in the analysis for this section. The size breakdown is: 87 small; 31 medium, 26 large and 11 very large wineries.

Motivating reasons for creating the web site – Survey Question 4.2

Information was sought on each winery's motivations and purposes in adopting a public web site. The final responses are summarised in Table 5-18, including responses by winery size where the differences are significant.

The responses are discussed in decreasing order of total response frequency from the 155 respondents. The top two reasons, regardless of winery size, are 1) to provide general winery information to the public: 92% of respondents selected this option; and 2) to promote wine brands and the winery image: 87% of respondents selected this option.

Table 5-18 Motivating reasons for wineries to create their public web sites

Motivation for creating the web site - respondents tick as many as apply	Wineries	Responses from 155 respondents		$\chi^2(3)$	p-value
Provide general winery information	All	143	92.3%		
Promote brands and winery image	All	135	87.1%		
Provide tourist information to increase cellar door sales	Small	62	71.3%	13.03	0.005
	Medium	21	67.7%		
	Large	19	73.1%		
	Very large	2	18.2%		
	TOTAL	104	67.1%		
Provide a sales channel with online ordering facilities	Small	59	67.8%	20.52	0.000
	Medium	20	64.5%		
	Large	9	34.6%		
	Very large	1	9.1%		
	TOTAL	89	57.4%		
Need to have one as it is now expected	All	84	54.2%		
Supply information on how to buy wine from existing retailers and distributors	All	70	45.2%		
Reduce marketing costs	All	43	27.7%		

The third most popular reason of promoting tourism in order to increase cellar door sales, while applying to about 70% of small, medium and large wineries, appears to have much less relevance for the very large wineries, with only 2 of the possible 11 selecting this option, resulting in a significant difference between the responses by winery size ($\chi^2(3)=13.03$, $p<.01$, $N=104$). It is likely that the very large wineries do not rely on cellar door sales as much as the smaller wineries.

Even stronger evidence of difference by winery size emerges for the fourth reason - using the web site as an additional sales channel ($\chi^2(3)=20.39$, $p<.01$, $N=89$). In this case only one of the very large wineries selected this option, while the proportion of responses from large wineries was only about half that from the small and medium wineries. The motivation for using the web to encourage and support sales appears to be much stronger for smaller wineries than it is for large wineries.

The responses to the remaining three reasons show no significant difference by winery size: 54% felt they had to have a web site because it is now expected; 45% were motivated to use the web to advertise their distributors and retail outlets as a mechanism for increasing sales; while 28% hoped it could reduce marketing costs.

Apart from the seven options provided, twelve respondents gave additional reasons or provided further clarification. The additional feedback includes: one site added by a public company winery to provide financial information to shareholders and potential investors; four sites added specifically to provide information on a global scale in order to encourage export sales; two sites added to support and recruit wine club members; and two winery web sites constructed to meet school project needs rather than for any perceived benefit for the winery!

Length of time that wineries have had a public web site – Survey Question 4.3

Respondents were asked to indicate the number of years their winery has had a public web site as a measure of their experience and exposure to this particular e-business process. The responses indicate that most wineries, over 80%, have been using public web sites for more than a year, with the breakdown of the 155 responses as follows: 27 sites (17.4%) are less than one year old; 61 sites (39.4%) are between one and three years old; while 67 sites (43.2%) are more than three years old. There is no significant difference between the web site age and the winery size.

Online sales of wine – Survey Questions 4.4 to 4.6

In order to investigate online sales of wine in more detail, respondents were asked about their online pricing strategy. Of the 100 wineries offering online sale options, 70% sell at the full retail price and only 17% offer discount prices; the remaining 13% use a combination of pricing strategies for different customer types, with wine club members generally enjoying a discount. No significant difference by winery size exists between the different pricing strategies.

For almost 80% of wineries offering online sale options, the volume of online sales has fallen short of expectations. See Table 5-19 for a summary of the responses.

Table 5-19 Degree to which online sales have met management expectations

Online sales met expectations?	N=99	
1 - Much lower than expected	29	29.3%
2 - Lower than expected	48	48.5%
3 - Met expectations	17	17.2%
4 - Better than expected	3	3.0%
5 - Much better than expected	2	2.0%

For the 55 wineries not selling wine online, the most common reason appears to be the lack of priority given to this option with 46% of the responses. A further quarter of respondents indicate they do not include the option of online sales in order to avoid conflict with existing business customers, while another 10% feel there is insufficient benefit in the online option. Table 5-20 reports the responses.

Table 5-20 Reasons for wineries deciding not to sell their wine online

Major reason for not providing the option to sell wine online	Responses from 55 respondents	
Priority of adding online sales currently not high enough	25	46%
Avoid conflict with existing business customers	14	25%
Not enough demonstrated benefit	6	11%
Other	10	18%

Two of the “Other” respondents indicated that their wineries were planning to add online sales soon, leaving eight respondents providing alternative reasons for not selling online. These reasons included: security concerns (3); unsuitable medium for selling wine (2); too costly (1); not enough time (1); and not relevant for contract winery operation (1).

Winery public web sites and what is included – Survey Question 4.7

In order to gather further information about the nature and purpose of the winery web sites, nine different content topics or functions were listed and respondents were asked to tick those that were included in their own winery’s public web site. The nine options, while not an exhaustive list of possibilities, were designed to gather further evidence of the nature and extent of B2C e-business behaviour. Table 5-21 provides the results with Chi-square test results for those options where significant differences occur by winery size.

The response difference by winery size for the online ordering and related payment options is expected and consistent with earlier findings for question 4.2 above. These options are rarely included in sites of very large wineries whereas they are most likely in the sites of small wineries. There is also significant difference in the likelihood of the site including contact details of major distributors and retailers ($\chi^2(3)=12.17$, $p<.01$, $N=82$), with the likelihood increasing as the winery size increases, ranging from 42% for small wineries up to 91% for very large wineries.

This finding supports the observation that the larger the winery, the more the winery uses the online environment to support the existing distribution chain rather than as an additional medium for generating direct sales.

Table 5-21 Winery public web site content

Content in Winery B2C web sites	Wineries	Responses from 155 respondents		$\chi^2_{(3)}$	p-value
Product information	All	148	95.5%		
Online ordering	Small	64	73.6%	20.78	0.000
	Medium	18	58.1%		
	Large	9	34.6%		
	Very large	2	18.2%		
	TOTAL	93	60.0%		
Contact details of distributors & retailers	Small	37	42.5%	12.25	0.007
	Medium	19	61.3%		
	Large	16	61.5%		
	Very large	10	90.9%		
	TOTAL	82	52.9%		
Register online to join wine club	All	73	47.1%		
Offline payment options	Small	54	62.1%	11.95	0.008
	Medium	9	29.0%		
	Large	8	30.8%		
	Very large	1	9.1%		
	TOTAL	72	46.5%		
Links to other wineries and tourist destinations	All	63	40.6%		
Online payment options	Small	35	40.2%	20.01	0.000
	Medium	14	45.2%		
	Large	3	11.5%		
	Very large	1	9.1%		
	TOTAL	53	34.2%		
Privacy Policy	All	47	30.3%		
Security Policy	All	41	26.5%		

Rating of public web site’s importance as part of the business strategy – Survey Question 4.8

Of the 155 respondents with public winery web sites, 152 provided a rating of the importance of their public web site within the overall business strategy. The responses show no statistically significant difference by winery size. Over three quarters of respondents judged their public web sites to be either moderately, very or extremely important. Only four respondents judged the public web sites to have no

importance at all, and all four were from small wineries. A detailed summary of responses is provided in Table 5-22.

Table 5-22 Estimates of the importance of the winery’s public web site by winery size

Winery Size	Not at all important		Not very important		Moderately important		very important		extremely important		Total
Small	4	5%	18	21%	43	49%	19	22%	3	3%	87
Medium	0	0%	3	10%	18	60%	5	17%	4	13%	30
Large	0	0%	6	24%	10	40%	7	28%	2	8%	25
Very Large	0	0%	3	30%	6	60%	1	10%	0	0%	10
Total	4	3%	30	20%	77	51%	32	21%	9	6%	152

Delivered benefit from winery public web sites compared with management expectations – Survey Question 4.9

The feedback on the difference between the delivered benefits from the public web site and management’s expectation of benefit are summarised in Table 5-23. The results of a Kruskal-Wallis K Independent Sample test show the responses are significantly different by winery size ($\chi^2(3)=19.6$, $p<.01$, $N=150$): more small wineries found that the benefits from the B2C web sites fell short of expectations than the larger wineries, whereas nearly all very large wineries felt their sites did live up to expectations.

Table 5-23 Comparison of delivered benefits from the public web site and management expectations

Winery Size	Much lower than expected		Lower than expected		Met expectations		Better than expected		Much better than expected		Total	$\chi^2(3)$	p-value
Small	11	13%	44	51%	27	31%	4	5%	0	0%	86		
Medium	1	3%	6	20%	19	63%	4	13%	0	0%	30		
Large	1	4%	10	40%	13	52%	0	0%	1	4%	25		
Very Large	0	0%	1	11%	8	89%	0	0%	0	0%	9		
Total	13	9%	61	41%	67	45%	8	5%	1	1%	150		

5.3.4 Winery extranet web site – business to business

Only nine wineries indicated that they had a B2B extranet web site with access restricted to groups such as business partners, media and industry press. This represents just 4.6% of the 195 wineries with internet access. Only descriptive statistics are reported in this section because of the low numbers. The wineries are distributed as follows: two small; one medium; three large; and three very large. The following summaries are based on the nine extranet cases.

Extranet users – Survey Question 5.2

From a list of six possible groups, respondents were asked to indicate which business groups used their extranets. Respondents were also able to add other groups if they were not in the list. The responses are summarised in Table 5-24.

Table 5-24 Frequency of use of winery extranet sites by different business groups

Extranet Users	Responses from 9 respondents
Retailers	7
Distributors and agents	7
Press groups	5
Business partners	4
Own employees	4
Suppliers	1
Other	1

Despite the low response numbers a pattern of use emerges. The extranet is used most by groups involved in the marketing stage of selling the wine product, with seven responses each for retailers and distributors and agents. One respondent included advertising agencies as another group using their winery extranet. The extranet is used least by groups involved in the production stage of wine manufacture, with only one response for the supplier groups. However the extranet is also used by some wineries to support internal business activity, with four respondents indicating that their extranet is also used by both business partners and winery employees.

Extranet content – Survey Question 5.3

The provision of product and company information to business customers and marketers appears to be the dominant purpose of the extranet sites, with the final responses to extranet site content provided in Table 5-25.

Table 5-25 Content available on winery extranet sites

Extranet Content	Responses from 9 respondents
Image files	7
Product specifications	7
Tasting notes	6
Company information	5
Online ordering	4
Other	1
Order status	0

Extranet’s importance as part of the winery’s business strategy – Survey Question 5.4

For the sake of reporting consistency, the importance ratings provided by the respondents with regard to their extranet sites are presented in Table 5-26 for each winery size. Both respondents from the small wineries indicated that their extranets have no importance at all, while all three respondents from very large wineries indicated that their extranets are either moderately or very important. The extranet of the one medium size winery rated as very important, while the extranets of the three large wineries showed mixed results with two judged as moderately important while one was considered to be not very important.

Table 5-26 Importance of extranet sites by winery size

Winery Size	Not at all important		Not very important		Moderately important		very important		extremely important		Total
Small	2	100%	0	0%	0	0%	0	0%	0	0%	2
Medium	0	0%	0	0%	0	0%	1	100%	0	0%	1
Large	0	0%	1	33%	2	67%	0	0%	0	0%	3
Very Large	0	0%	0	0%	2	67%	1	33%	0	0%	3
Total	2	22%	1	11%	4	44%	2	22%	0	0%	9

Delivered benefits from extranets compared with management expectations – Survey Question 5.5

The feedback on the difference between the level of perceived benefit from the winery’s extranet site and management expectations is summarised in Table 5-27. Once again the responses are shown for each winery size for consistency of reporting. Both respondents from the small wineries report much lower than

expected benefit, while the three respondents from the large wineries report better than expected benefits. The respondent from the medium winery reports the benefits have met expectations, while the responses from the three very large wineries are spread one apiece between lower than expected, meeting expectations or bettering expectations.

Table 5-27 Responses indicating whether benefits of extranets have met management expectations by winery size

Winery Size	Much lower than expected	Lower than expected	Met expectations	Better than expected	Much better than expected	Total
Small	2 100%	0 0%	0 0%	0 0%	0 0%	2
Medium	0 0%	0 0%	1 100%	0 0%	0 0%	1
Large	0 0%	0 0%	0 0%	3 100%	0 0%	3
Very Large	0 0%	1 33%	1 33%	1 33%	0 0%	3
Total	2 22%	1 11%	2 22%	4 44%	0 0%	9

5.3.5 Winery intranet web site for internal business use

Only 16 or 8% of the 195 wineries with internet access have an intranet site, and only descriptive statistics are reported due to the low numbers. Table 5-28 shows the distribution of respondents by winery size, and also shows that the proportion of wineries in the four different winery sizes increases as the winery size increases. Larger wineries appear more likely to have an intranet than smaller wineries.

Table 5-28 Distribution of respondents by winery size

Winery Size	Number	Proportion of winery size
Small	2	2%
Medium	3	9%
Large	6	19%
Very Large	5	42%

Major purposes of the intranet – Survey Question 6.2

In order to collect information on the nature of intranets within wineries, information was sought on their major purposes with the responses shown in Table 5-29. The provision of up-to-date business information including relevant forms appears to be the major reason for intranet adoption and use.

Table 5-29 Major purposes of winery intranets

Major purposes of the intranet	Response numbers	Response %, N=16
Distribution point for up-to-date policies, procedures and forms	14	88%
Provide business reports and/or company information to staff	12	75%
Allow staff to update their own personal contact details	5	31%
Other...includes	4	25%
provide product data		
support workgroups		
update winery data		
back up data		

Rating of intranet’s importance as part of the business strategy – Survey Question 6.3

Of the 16 respondents, 14 indicated that their intranet site was important – of these, 12 were either very or extremely important in terms of the winery’s business strategy. The intranets in the remaining two wineries were judged to be not very important. The responses are summarised in Table 5-30.

Table 5-30 Estimates of importance of the winery’s intranet by winery size

Winery Size	Not at all important		Not very important		Moderately important		very important		extremely important		Total
Small	0	0%	0	0%	1	50%	1	50%	0	0%	2
Medium	0	0%	0	0%	0	0%	2	67%	1	33%	3
Large	0	0%	1	17%	2	33%	2	33%	1	17%	6
Very Large	0	0%	1	20%	1	20%	3	60%	0	0%	5
Total	0	0%	2	13%	4	25%	8	50%	2	13%	16

Delivered benefit from intranets compared with management expectations – 6.4

Table 5-31 summarises the ratings of how well the delivered benefits from the intranet compare to management’s expectations, with two responses missing. Ten respondents reported a positive outcome, with their intranets meeting or exceeding expectations, while the remaining four judged the benefits to be less than the expectations.

Table 5-31 Comparison between delivered benefits from the intranets and management expectations

Winery Size	Much lower than expected		Lower than expected		Met expectations		Better than expected		Much better than expected		Total
Small	0	0%	1	50%	1	50%	0	0%	0	0%	2
Medium	0	0%	0	0%	1	50%	0	0%	1	50%	2
Large	1	17%	1	17%	3	50%	1	17%	0	0%	6
Very Large	0	0%	1	25%	2	50%	1	25%	0	0%	4
Total	1	7%	3	21%	7	50%	2	14%	1	7%	14

5.3.6 E-business in general

Details about the nature and extent of e-business have been collected at the process domain level in order to gather specific information, and these are summarised above in sections 5.3.1 to 5.3.5. However, respondents were also asked to provide some feedback on e-business in general, and the responses relating to the degree of change over the last two years are now summarised. All 195 respondents from wineries with internet access are included for this analysis.

Estimate change in the use of e-business in general over the last two years – Survey Question 7.1

The survey was conducted during the latter months of 2003. The period of change referred to in this question therefore covers the years 2002-03, and possibly includes the latter part of 2001. Ten responses were missing. A Kruskal-Wallis K Independent Sample test provides evidence of a strong and significant difference in the extent of e-business change by winery size ($\chi^2(3)=23.2, p<.01, N=185$). In general, wineries are more likely to have experienced a greater increase in e-business adoption/diffusion the larger the winery size. Table 5-32 provides a detailed summary of responses.

Table 5-32 Level of change of e-business use over previous two years

Winery Size	Decrease		Same		Moderate increase (< double)		High increase (> double)		Total
Small	1	0.9%	25	22.7%	70	63.6%	14	12.7%	110
Medium	0	0.0%	1	2.9%	23	67.6%	10	29.4%	34
Large	0	0.0%	1	3.3%	18	60.0%	11	36.7%	30
Very Large	0	0.0%	0	0.0%	6	54.5%	5	45.5%	11
Total	1	0.5%	27	14.6%	117	63.2%	40	21.6%	185

5.4 Barriers to use of e-business

For this section, the responses from all 198 usable cases were used.

Barriers to further (or any) adoption of e-business – Survey Question 8.1

Sixteen possible barriers to further (or any) adoption of e-business were listed on the questionnaire. Respondents were asked to tick as many as applied to their winery, and could add other barriers. The responses to five barriers were significantly different according to winery size: see Table 5-33 for a summary in descending order of frequency, with the results by winery size where significant.

Table 5-33 Frequency of possible barriers to further (or any) e-business adoption

Possible Barriers	Wineries	N=198		$\chi^2(3)$	p-value
Cost of developing software	All	101	51%		
Limitations of available network access speeds	All	97	49%		
Cost of adequate connection to physical networks	All	75	38%		
Lack of e-business activity by customers	Small	49	41%	8.55	0.036
	Medium	5	14%		
	Large	10	32%		
	Very large	4	33%		
	TOTAL	68	34%		
Concern over security of data exchanges	All	67	34%		
Insufficient internal resources	All	59	30%		
Cost/benefit analysis not favourable	Small	36	30%	9.52	0.023
	Medium	4	11%		
	Large	3	10%		
	Very large	4	33%		
	TOTAL	47	24%		
A cautious approach to the use of the internet	All	43	22%		
Insufficient relative advantage	All	36	18%		
Internal data not in appropriate format	All	34	17%		
Lack of digital signatures for legal requirements	All	30	15%		
Software & hardware issues too complex	All	28	14%		
Lack of e-business activity by suppliers	Small	11	9%	13.24	0.004
	Medium	3	9%		
	Large	10	32%		
	Very large	3	25%		
	TOTAL	27	14%		
Existing core IT systems not Internet-enabled (eg Ez	Small	7	6%	17.86	0.000
	Medium	4	11%		
	Large	9	29%		
	Very large	4	33%		
	TOTAL	24	12%		
Lack of integrity of internal data	All	21	11%		
Lack of e-business activity by business partners	Small	6	5%	10.57	0.014
	Medium	2	6%		
	Large	7	23%		
	Very large	1	8%		
	TOTAL	16	8%		
Other		11	N/A		

The top two barriers, mentioned by half of the respondents, are the software development costs and the speed limitations of the physical networks providing access to the Internet. The cost of adequate connection to the Internet comes third on the list of barriers with 75 or 38% responses. The lack of activity by supply chain participants emerges as an area where the responses consistently vary significantly by winery size. The lack of customer activity ranks highest ($\chi^2(3)=8.55$ $p<.05$, $N=68$) with small wineries more likely to view this as a barrier than larger wineries; lack of supplier activity came low on the list ($\chi^2(3)=13.24$ $p<.01$, $N=27$) with this barrier more likely for large and very large wineries than for small and medium size wineries; while the lack of e-business activity by business partners was the least common barrier selected ($\chi^2(3)=10.57$, $p<.05$, $N=16$), with mainly large wineries indicating this as a problem area.

Security concerns were felt to be a barrier by 34% of respondents and the lack of sufficient internal resources was selected by 30%, with neither of these barriers affected by winery size. However the cost/benefit analysis with regard to e-business does differ significantly by winery size ($\chi^2(3)=9.52$, $p<.05$, $N=47$), and affects the extreme ends of the winery sizes more than the sizes in the middle ~ 30% of small and very large wineries compared with ~10% of medium and large wineries. The only remaining barrier which varied by winery size was the problem of existing core IT systems not being Internet-enabled ($\chi^2(3)=17.86$, $p<.01$, $N=24$): the likelihood of this barrier increases as winery size increases, and ranged from 6% of small wineries to 33% of very large wineries.

The remaining barriers were not affected by winery size: generally cautious approach to the Internet (22%); insufficient relative advantage (18%); internal data not in appropriate format (17%); lack of digital signatures (15%); software and hardware issues too complex (14%); and a lack of integrity in the winery's internal data (11%).

5.5 Proposition testing

Much of the following proposition testing uses responses to the factor statements within the survey. The factor statements use a 5-point Likert scale for the level of agreement. The “Do not know” responses are treated as missing responses for the statistical calculations. The Likert scale, while strictly an ordinal scale, has been shown to have sufficient interval characteristics for the computation of means not to be invalid: “arithmetic means seem to closely reflect group attitudes towards the stimuli” (Hofacker 1984). Therefore the response means are used to illustrate differences in responses by winery size when the non-parametric tests for ordinal data show a significant difference by size exists. Response differences by winery size for the factor statements are investigated using the Kruskal-Wallis K Independent Sample test, which is appropriate for an ordinal scale, and which makes no assumptions about the underlying distributions of the data, which in this case is not normally distributed.

5.5.1 Proposition 1 – varies by winery size

P1: The nature and extent of adoption of e-business processes by wineries will differ significantly between wineries in different size categories.

The analysis of the nature and extent of e-business adoption in section 5.3 and analysis of the barriers to further adoption in section 5.4 illustrates that many aspects of e-business adoption differ significantly for wineries in different size categories. Examples include the use of e-mail, where the usage trend increases as winery size increases; and the use of external sites, with larger wineries using the web for more reasons than smaller wineries. In particular the large and very large wineries are more likely to conduct online compliance processes such as wine export approvals and customs clearances than the smaller wineries. With regard to winery B2C sites, the smaller wineries are more likely to adopt the web as an additional sales medium whereas larger wineries are more likely to avoid online sales and opt to support existing distribution networks to avoid potential conflict. With regard to e-business in general, the level of change of e-business adoption/diffusion over the last two years has been greater the larger the winery.

In addition to the examples discussed above, the responses to a number of the factor statements in the different e-business process domains also vary significantly by winery size, providing further support that winery size not only affects e-business behaviour, but also the ways that potential influences operate. To investigate these differences, the mean response for each winery size/factor combination is computed for each process domain (excluding the extranet and intranet statements due to the very low response numbers), and where the Kruskal-Wallis K Independent Sample test results show a significant difference, the test results are displayed.

Table 5-34, for example, shows the responses to the three e-mail statements which vary significantly by winery size; in each case it is the difference in the responses between the small wineries and the larger sizes that is greatest. From statements 2.7, 2.8 and 2.13 it appears that small wineries, when compared with the larger wineries, have a lower preference for using e-mail, have fewer resources to support e-mail use, and find less convenience from communicating with government staff via e-mail.

Table 5-34 Response mean by winery size to e-mail factor statements

Email statements	Small	Medium	Large	Very Large	K-W	p-value
2.7 We prefer to use e-mail as it is now the standard form of communication	3.65	4.26	4.03	4.08	12.3	0.006
2.8 We have sufficient resources to ensure e-mail is available to all staff who need it	3.78	4.11	4.29	4.50	11.7	0.009
2.13 The easiest way to communicate with Gov't is by e-mail	3.11	3.56	3.55	3.67	9.8	0.02

With respect to use of external web sites, the responses for four of the eight factor statements differ significantly by winery size: these are reported in Table 5-35. From statement 3.6, the advantage from accessing industry information online and consequently speeding up work increases as winery size increases ($\chi^2(3)=23.6$, $p<.01$, $N=192$). From statement 3.7, small wineries find less advantage from using external web sites than larger wineries ($\chi^2(3)=27.8$, $p<.01$, $N=192$). From statement 3.12, respondents are less likely to consider that the government is forcing increasing use of e-business by mandating future use of online options to gain export declarations if they work in a small winery compared with a larger winery ($\chi^2(3)=20.16$, $p<.01$, $N=151$). Finally, from statement 3.13, small wineries are less likely to find that compliance with government regulations is made easier by

accessing relevant information from government web sites than larger wineries ($\chi^2(3)=12.93, p<.01, N=180$).

Table 5-35 Response mean by winery size to external web site factor statements

External Webs	Small	Medium	Large	Very Large	K-W	p-value
3.6 Accessing industry information online speeds up our work	3.64	4.23	4.23	4.27	23.6	0.000
3.7 Our use of external web sites is increasing because of the advantages that the Web delivers	3.55	4.29	4.10	4.27	27.8	0.000
3.12 The Aust. Gov't is forcing increased use of e-business by mandating use of online options for export declarations	3.24	3.59	3.57	4.11	20.2	0.000
3.13 Compliance with Gov't regulations is easier with relevant information on Gov't web sites	3.39	3.79	3.96	3.60	12.9	0.005

Table 5-36 reports the response means to the three factor statements related to the winery's own public web site where these differ significantly by winery size. From statement 4.11, small wineries are less inclined to not want to be without their B2C site ($\chi^2(3)=10.8, p<.05, N=153$): this fits with the lower benefits that small wineries associate with web sites compared with larger wineries as shown in the responses to survey question 4.9 reported earlier in section 6.3.3. From statement 4.13, it appears that the larger the winery, the less restricted they are in using outsourcing options to develop their web sites ($\chi^2(3)=8.4, p<.05, N=145$). From statement 4.15, the larger the winery the more likely it is that the reactions of the distribution chain will be considered when deciding on the functionality of their web site ($\chi^2(3)=13.6, p<.01, N=143$).

Table 5-36 Response mean by winery size to B2C web site factor statements

Public Webs	Small	Medium	Large	Very Large	K-W	p-value
4.11 We would not like to be without our public Web site now as it delivers many marketing benefits	3.36	3.94	3.75	3.64	10.8	0.013
4.13 Due to use of outsourcing options, what we do on our Web site is not restricted by internal expertise and skill levels	3.01	3.33	3.41	3.73	8.4	0.038
4.15 We consider the reactions of our distribution chain when deciding on the functionality of our Web site	3.03	3.14	3.63	3.82	13.6	0.003

For e-business in general, the responses to four factor statements differ significantly by winery size: the responses are reported in Table 5-37. These statements mainly reinforce earlier findings rather than contributing something new: small wineries

observe less benefit from e-business; the larger the winery the greater is their perceived resource capacity for implementing and supporting e-business; while larger wineries are more likely than small wineries to find that the online activities of government act as a positive influence on their own online behaviour.

Table 5-37 Response mean by winery size to general e-business factor statements

General	Small	Medium	Large	Very Large	K-W	p-value
7.2 Benefits gained from internet/Web use for business are significant	3.47	4.03	4.06	4.00	17.9	0.000
7.3 Using the internet/Web instead of other forms of communication has not delivered us any real advantages yet ** Reverse coded	3.18	3.71	3.71	3.50	10.7	0.013
7.5 We do not have sufficient expertise and skills to do more with e-business ** Reverse coded	2.98	3.34	3.48	3.67	9.4	0.024
7.8 By providing the option to complete Wine Export Approvals online, the Aust. Gov't is encouraging increased use of e-business by wineries	3.71	3.84	4.10	4.09	8.7	0.033

In conclusion, there is strong evidence to support the first proposition that the nature and extent of adoption of e-business processes by wineries differs significantly between wineries of different sizes – both in terms of the practice and also in terms of factors acting as influences on that behaviour.

5.5.2 Proposition 2 – depends on e-business process domain

P2: Factors influencing e-business adoption behaviour do not impact in the same way for different e-business process domains.

To test this proposition, the responses to the factor statements in the different e-business process domains are treated as repeated observations from the same respondent, and compared for differences. The non-parametric Friedman test for K related samples is used, for which no assumptions about the distribution of the data are made. Small p-values for this test ($p < 0.05$) provide evidence that there is significant difference between the repeated scores for each e-business type. The responses to the factor statements for extranets and intranets are not included due to the small response numbers for these process domains. The responses to the factor

statements for e-mail, use of external web sites, use of the winery’s public web site, and e-business in general are used, giving four different observations of the same factor for each respondent.

Table 5-38 reports the results of the reliability tests conducted on the four sets of factor statements and their corresponding coefficient alpha values. The measure of internal consistency of .805 for the relative advantage statements indicates that the scale for this factor is reliable. The alpha value of 0.65 for the resource and government factors is very close to what is normally considered to be acceptable. The alpha value of 0.48 for the supply chain factor indicates that the statements do not display internal reliability (George & Mallery 2003). The low alpha score for the supply chain factor in particular represents a limitation to this research, given that the analysis conducted for this proposition relies on the assumption that the repeated observations are based on the same factor. However, in the interest of investigating this proposition the decision is taken to continue the analysis on the understanding that caution must be used in interpreting the results.

Table 5-38 Cronbach’s Alpha scores for the factor items

Factor	Statements	Cronbach’s Alpha N of items = 8
Relative advantage	2.6, 2.7, 3.6, 3.7, 4.10, 4.11, 7.2, 7.3	.805, N =150
Resources	2.8, 2.9, 3.8, 3.9, 4.12, 4.13, 7.4, 7.5	.657, N = 137
Supply chain	2.10, 2.11, 3.10, 3.11, 4.14, 4.15, 7.6, 7.7	.481, N = 126
Government	2.12, 2.13, 3.12, 3.13, 4.16, 4.17, 7.8, 7.9	.654, N = 102

The score for each factor/domain combination is computed by adding the responses from the two statements for that factor and dividing the result by 2. For example, a new variable for the relative advantage/e-mail combination, called ‘ra_e-mail’, is computed using the two e-mail questions 2.6 and 2.7; a variable called ‘ra_ews’ is computed for the relative advantage/external web sites combination using the statements 3.6 and 3.7, and so on. The Freidman test is used to analyse whether there are differences in the agreement level between the impact of each individual factor and the different e-business process domains.

The Friedman test results are computed for each winery size separately, and also for all respondents regardless of winery size, in order to investigate whether winery size alters the trend in differences between different e-business categories. The test results provide strong evidence that the four factors do impact in significantly different ways between different e-business categories, and that this difference occurs regardless of winery size – that is, winery size has no effect. Table 5-39 reports the results for the relative advantage factor – all tests show significant difference between the domains.

Table 5-39 Friedman test results for relative advantage statements

Friedman test for relative advantage factor, df = 3	E-mail	External Sites	Public Web sites	E-business in general	N	Chi-Square	Significance
All wineries	3.28	2.81	1.65	2.26	150	158.7	0.000
Small	3.35	2.68	1.74	2.24	85	83.2	0.000
Medium	3.24	2.95	1.66	2.15	31	39.5	0.000
Large	3.25	2.98	1.42	2.35	24	32.4	0.000
Very large	2.85	3.10	1.50	2.55	10	11.0	0.012

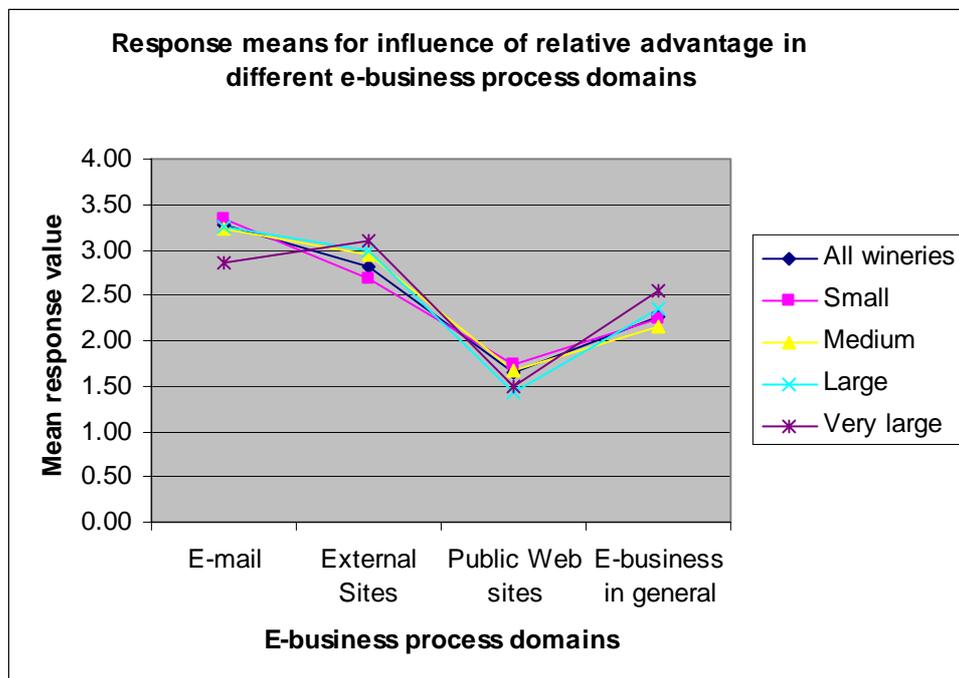


Figure 5-4 Comparison of mean response for influence of relative advantage in different e-business process domains

Figure 5-4 illustrates the marked difference in levels of influence that the perception of relative advantage plays in different areas of e-business: for example, relative

advantage is associated with e-mail to a much higher degree than with public web sites. These differences are consistent across all winery sizes.

Table 5-40 reports the results for the resources factor – once again, all tests show significant difference between the mean factor values regardless of winery size.

Table 5-40 Friedman test results for resource statements

Friedman test for resources factor, df = 3	E-mail	External Sites	Public Web sites	E-business in general	N	Chi-Square	Significance
Small	3.36	2.54	1.83	2.27	78	68.0	0.000
Medium	3.31	2.60	1.72	2.36	29	25.8	0.000
Large	3.57	2.52	1.74	2.17	21	27.4	0.000
Very large	3.89	2.28	1.89	1.94	9	15.8	0.001

Figure 5-5 illustrates that the perception of resource capacity also operates differently in different e-business process domains, and appears to have most influence on e-mail use rather than the use of web sites. The chart shows the consistency of response across all winery sizes.

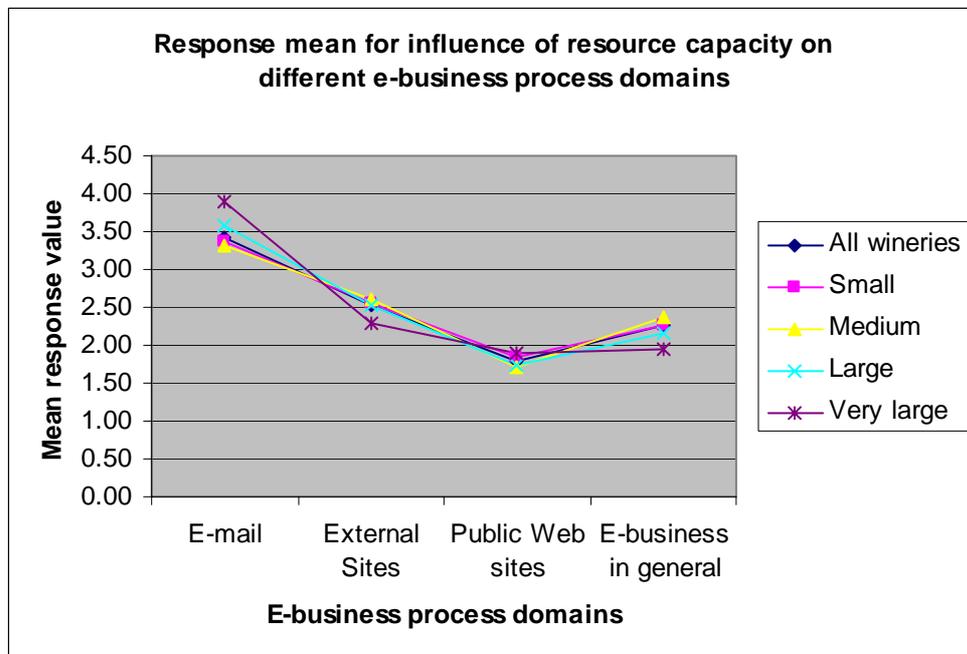


Figure 5-5 Comparison of mean response for influence of resource capacity in different e-business process domains

Table 5-41 reports the results for the supply chain factor. The very large wineries provide the only exception to the otherwise consistent significant difference between responses to the supply chain statements for the different e-business process domains, but even so the trend here is similar.

Table 5-41 Friedman test results for supply chain statements

Friedman test for supply chain, df = 3	E-mail	External Sites	Public Web sites	E-business in general	N	Chi-Square	Significance
Small	2.88	2.81	2.09	2.21	69	23.5	0.000
Medium	2.73	3.17	2.17	1.92	26	18.5	0.000
Large	2.52	3.00	2.52	1.96	23	8.9	0.031
Very large	2.50	2.94	2.69	1.88	8	3.4	0.336

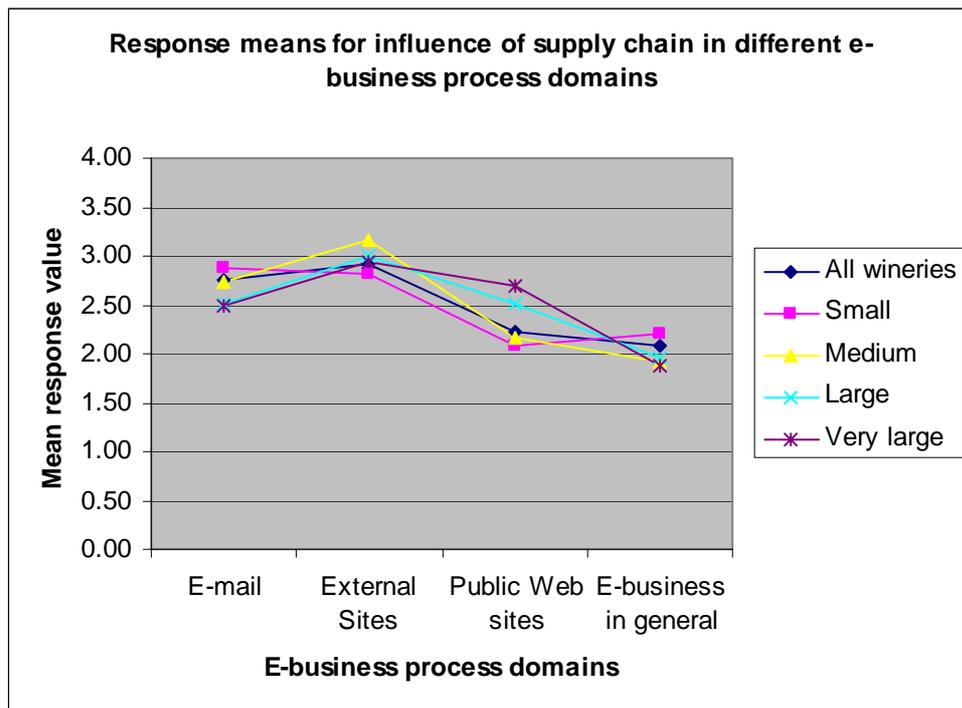


Figure 5-6 Comparison of mean response for influence of supply chain in different e-business process domains

Figure 5-6 illustrates the supply chain factor trends and the greater disparity and spread between the mean responses of the different size wineries with regard to their perception of the supply chain influence on the different e-business activities within

the winery compared to the influence of relative advantage or resource capacity. For example, the supply chain factor has greater influence on the public web sites of the large and very large wineries than the small and medium size wineries.

Table 5-42 reports the results for the government factor: once again, the differences between the response means are significant for all individual winery sizes, and regardless of winery size. Figure 5-7 plots the data, and illustrates the high level of agreement between the mean responses from the different winery size respondents.

Table 5-42 Friedman test results for government statements

Friedman test for Government, df = 3	E-mail	External Sites	Public Web sites	E-business in general	N	Chi-Square	Significance
All wineries	2.65	2.80	1.41	3.14	102	121.9	0.000
Small	2.66	2.68	1.52	3.15	60	60.3	0.000
Medium	2.68	3.03	1.32	3.00	19	26.2	0.000
Large	2.63	2.94	1.19	3.25	16	27.3	0.000
Very large	2.57	3.00	1.21	3.21	7	11.7	0.009

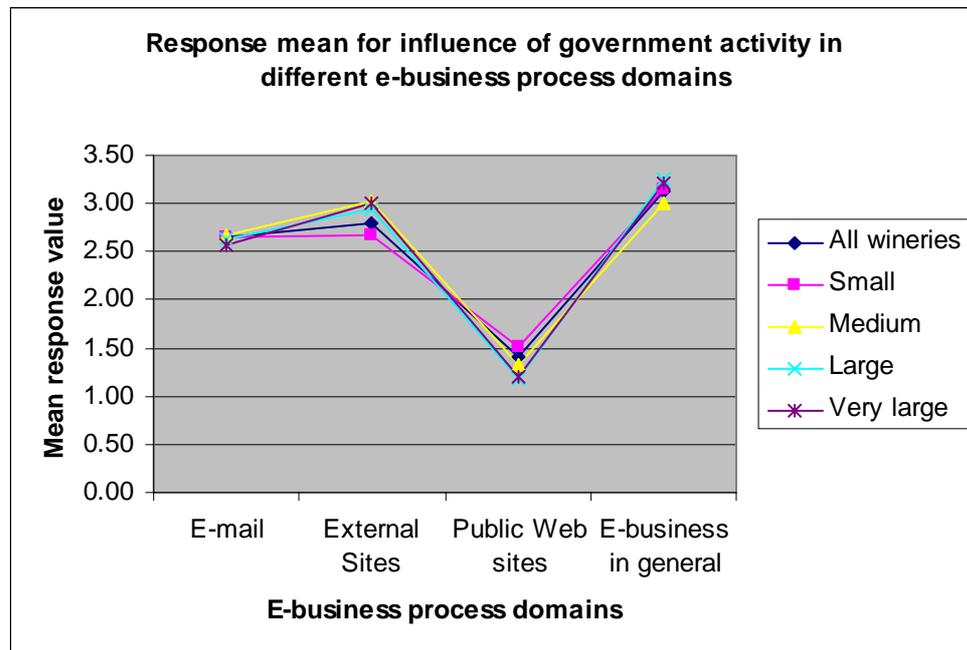


Figure 5-7 Comparison of mean response for influence of government activity in different e-business process domains

In conclusion, the Friedman test results provide strong evidence that factors influencing e-business adoption behaviour do not impact in the same way for

different e-business process domains, and thus the second proposition appears to be supported. However the lack of adequate reliability for the supply chain statements in particular limits interpretation of that result.

5.5.3 Proposition 3 – supply chain

P3: The nature and extent of adoption of e-business processes by wineries are influenced by the activities and perceived reactions of other organisations in the wineries' supply chain.

Some evidence has already been found in section 5.3 which suggests that, for some wineries at least, supply chain organisations do influence the e-business activities of the wineries. For example, in section 5.3.2 covering the use of external web sites, it was found that approximately one in eight wineries are using an online product catalogue system to provide product data to business customers because their business customers require them to do so. No significant difference between wineries of different size was detected for this particular example of supply chain influence, and so it appears that pressure from business customers applies to a wide range of winery types. Further evidence of supply chain influence is also found in section 5.3.3, with regard to winery B2C web sites, with 14 respondents indicating that the major reason their winery does not offer online sales is to avoid conflict with existing business customers.

The responses to the supply chain factor statements are examined next to see if further evidence of supply chain influence is found. For this next step the responses to individual statements, rather than aggregated responses from multiple statements, are compared in order to make use of the maximum detail available. The statement responses which show some level of agreement or disagreement are analysed: neutral and missing responses are not included. The Strongly Disagree and Disagree responses are combined and compared to the combined Agree and Strongly Agree responses. The response percentages are calculated from the maximum number of possible respondents.

Table 5-43 reports the percentage of respondents that either agree or disagree with each supply chain factor statement. Where the responses differ significantly by winery size, the response percentages for each size are presented.

Table 5-43 Supply chain factor statements and level of agreement

Supply chain influence associated with e-business processes	Wineries	SD+D %	A+SA %	N
2.10 Our level of e-mail use is driven by what others in our supply chain prefer	All	20%	51%	192
2.11 We use e-mail to build closer relationships with others in our supply chain	All	15%	51%	192
3.10 Our use of external Web sites is influenced by what others in our supply chain have placed on their Web sites	All	12%	41%	195
3.11 Trading partners and industry groups now offer so much useful online information and transaction processing capability that we are opting to use their Web sites more and more	All	14%	53%	195
4.14 The strategic role of our public Web site is restricted by the potential reactions of our existing customers	All	25%	22%	155
4.15 We consider the reactions of our distribution chain when deciding on the functionality of our Web site	S	28%	31%	87
	M	29%	39%	31
	L	17%	62%	26
	VL	9%	82%	11
5.10 We added the extranet to make it easier for others to do business with us	All	0%	100%	9
5.11 The need to provide data to supply chain partners was a driver in deciding to build the extranet	All	11%	78%	9
6.9 A motivation for having the intranet site was to ensure our staff could provide a better service to our suppliers and customers	All	6%	56%	16
6.10 The content of the intranet is influenced by the activities and needs of other companies in our supply chain	All	31%	25%	16
7.6 We cannot make decisions on how to use e-business in isolation – it depends on what others in the industry do	All	45%	28%	195
7.7 We are not big enough to lead the way with e-business, so we only adopt it when other groups in our supply chain make it worthwhile	All	36%	43%	195

The responses to statements 2.10 and 2.11 provide reasonable evidence of supply chain influence on e-mail use, with 50% of all respondents indicating that their use of e-mail is driven by the preferences of supply chain groups and that they use e-mail to build closer relationships within their supply chain. The responses to statements 3.10 and 3.11 regarding winery use of web sites operated by external groups indicates that

wineries' use of web sites of supply chain organisations increases as these sites become more useful and offer transactional processing capability.

Statement 4.14 appears to have been a problem for respondents, with just over half not willing to provide an opinion on whether the strategic role of the winery public web site is restricted by the potential reactions of existing customers or not. Exactly which aspect of this statement is problematic is unclear, but it is possible that respondents felt uncomfortable with the need to assess their web site's strategic role. However a much higher number of respondents did provide an opinion on statement 4.15 on whether or not the reactions of the distribution chain were considered when the functionality of the web site was determined. Responses to this statement differ significantly by winery size as reported in Table 5-36, with the likelihood of influence from the distribution chain increasing with winery size. The proportion of wineries reporting that they do consider the reaction of their distribution chain when deciding on the functionality of their public web site is: 31% of small, 39% of medium, 62% of large and 82% of the very large wineries.

While the number of wineries with extranets and intranets is very low, strong evidence of supply chain influence is found: all nine winery extranets were implemented to make it easier for other supply chain groups to do business with the wineries, with the need to provide data to supply chain partners one of the drivers in the decision to build the extranet in seven of the nine cases. Intranet sites are also seen as a mechanism for providing better service to supply chain groups, with nine of the 16 intranets adopted to increase the level of service winery staff can deliver to suppliers and customers.

With the benefit of hindsight, statements 7.6 and 7.7 about supply chain influence on e-business in general suffer from wording that is too strong and both represent an extreme position, such as statement 7.6's phrase 'We *cannot* make decisions...in isolation' and statement 7.7's '...we *only* adopt it when other groups in our supply chain make it worthwhile'. It is likely that the responses would have been different if the wording had been more moderate. However approximately 30-40% of respondents indicated that their decisions on how to use e-business depend on what others in the industry are doing; they also tend to adopt after other supply chain organisations ensure the adoption is worthwhile.

Thus, the nature and extent of adoption of e-business processes of many wineries is influenced by the activities and perceived reactions of other organisations in their supply chain. The level of supply chain influence is variable however, with the level of influence varying between different e-business process domains, and between wineries. Exactly which wineries are most affected is not so clear however. The only area where the responses varied significantly by winery size was for winery public web sites, with supply chain influence growing as size increases. Kruskal-Wallis K Independent Sample tests and chi-square tests revealed no significant relationship between the supply chain responses and other demographic variables such as export percentage and staffing levels.

In conclusion, support for proposition three is found, with many wineries finding that their e-business activities are influenced by the activities and perceived reactions of supply chain organisations. However this influence appears not to be consistently felt by all wineries. The need for further research into this area is indicated.

5.5.4 Proposition 4 – government influence

P4: The nature and extent of adoption of e-business processes by wineries are influenced by the provision of government online services and online compliance processes.

From the analysis presented in section 6.3, it is clear that many wineries are using e-mail with government staff, and also using the internet to access information from government sites. For example, 75% of respondents reported that staff in their winery use e-mail to communicate with government agencies and departments. To a lesser degree, wineries are using online compliance options where available – for example, just over 50% of exporting wineries process their wine export approvals online, while 22% indicated their winery processes customs' clearances online. From these observations it is possible to conclude that the nature and extent of e-business processes by many wineries is being influenced by the provision of government online services.

The nature of this influence is investigated further by analysing the level of agreement with the government-related factor statements, with a summary of the

responses provided in Table 5-44. The statement responses which show some level of agreement or disagreement are analysed in a similar manner to the supply chain statements in the previous section, with neutral and missing responses not included. The Strongly Disagree and Disagree responses are combined and compared to the combined Agree and Strongly Agree responses. The response percentages are calculated from the maximum number of possible respondents. Where the responses differ significantly by winery size, the responses for each size are presented separately.

From the responses to statements 2.12 half of the respondents feel that the government is encouraging communication via e-mail, but from responses to statement 2.13 the small wineries find less convenience from this option than the larger wineries. The responses to both statements dealing with government influence on the use of external web sites differ significantly by winery size, and in both cases very few respondents disagree with the statements. From statement 3.12 it appears that the pressure from the Australian Government for increased use of e-business to support exporting is felt more as winery size increases, or at least that awareness of this pressure increases with winery size. The responses to statement 3.13 provide clear evidence that most respondents are finding compliance with government regulations easier due to the functionality and utility of government web sites. Thus in the process domains of e-mail and external web sites, the evidence supports the proposition that wineries are influenced by government's online activities.

The influence of government's online activity appears to be much less with regard to the web sites that wineries create. From statement 4.17, most respondents agree that the government has no influence on their public web site, while the actions of the government appear to have almost no influence on winery extranet and intranet sites, although half the intranets include links to useful government web sites. With regard to statements 7.8 and 7.9 on e-business in general, most respondents agree that the government is encouraging increased e-business activity by providing the option to process wine export approvals online, ranging from approximately 60% of small and medium winery respondents to 90% of large and very large winery respondents. Just over half of all survey respondents, regardless of winery size, also feel that most wineries will be forced to use some e-business processes in the future simply because of the government's power to mandate how compliance will occur.

Table 5-44 Government factor statements and level of agreement

Statements related to Government influence on e-business processes	Wineries	SD+D %	A+SA %	N
2.12 The Government encourages us to communicate with them via e-mail	All	11%	49%	192
2.13 The easiest way to communicate with Government departments and agencies nowadays is by e-mail	S	22%	33%	114
	M	9%	51%	35
	L	10%	48%	31
	VL	8%	58%	12
3.12 The Australian Government is forcing increased use of e-business by mandating use of online options for export declarations by Dec 1st 2003	S	5%	24%	117
	M	3%	43%	35
	L	6%	45%	31
	VL	0%	75%	12
3.13 Compliance with Government regulations is easier now that necessary and relevant information can be located on the various Government Web sites	S	14%	55%	117
	M	3%	69%	35
	L	0%	81%	31
	VL	8%	50%	12
4.16 Some of the content on the Web site is included to demonstrate compliance with regulations	All	30%	23%	155
4.17 The Australian Government's push to increase e-business use by Australian companies has no influence on the content of our public Web site ** Reverse coded	All	6%	66%	155
5.12 We plan to increase the exchange of electronic information with business partners via our extranet so that it is easier to track our winery data for compliance purposes with Government regulations.	All	56%	22%	9
5.13 Electronic exchange of information through our extranet is partly driven by increasing provision of online services by Australian Government departments	All	78%	0%	9
6.11 One reason we added the intranet was to ensure compliance with Government regulations by making sure staff use up-to-date forms	All	44%	6%	16
6.12 We use the intranet to provide quick links to useful Government sites (eg AWBC)	All	25%	50%	16
7.8 By providing the option to complete Wine Export Approvals online, the Australian Government is encouraging increased use of e-business by wineries	S	4%	58%	117
	M	3%	66%	35
	L	0%	90%	31
	VL	0%	92%	12
7.9 Soon most wineries will have to use some e-business simply because the Australian Government will force them to do so by its power to mandate how compliance will occur	All	6%	53%	195

In conclusion, the survey responses provide evidence that the nature and extent of e-business adoption by wineries is being influenced by the provision of government information and compliance services online, but this influence is largely restricted to

the wineries' use of e-mail and government web sites. The level of impact also appears to be significantly less for small wineries than for the larger wineries. Proposition four is therefore supported with the following qualifications: the influence is mainly limited to the use of e-mail and government web sites for information and compliance purposes; and the impact appears significantly less for small wineries than for larger wineries.

5.6 Comments from respondents

Comments were received from 52 of the 198 respondents. The full list of comments is presented in Appendix G in Table G-1. The comments are listed in order by the winery size, and within each winery size by the order of the actual tonnage range. Several common themes emerge from the comments. Most of the comments highlighted problems associated with e-business rather than positive outcomes. In particular, slow connections and lack of broadband due to sub-standard telecommunication infrastructure in rural areas were repeatedly stressed as a major impediment to further adoption of e-business for many wineries.

E-mail was also mentioned by many respondents – on the negative side the problem of 'spam' e-mails is becoming a serious hindrance to some, particularly those with slow connections; while on the positive side e-mail is largely viewed as a useful form of communication. There were a few notes of caution related to the use of e-mail. Some respondents mentioned that they take care to also use other forms of communication as well to maintain a more personal relationship: comment from a large winery respondent “... *but increasingly we're making sure that we don't forget to telephone or meet face to face with people as it can become very impersonal doing everything online*”.

The feedback on the winery web sites was also mixed. One small winery is having great success with their online sales: “*virtually all our retail sales are done by e-business (~60% of our production)*”. However this positive feedback is the exception from a mainly negative collection of comments: sales from web sites are generally reported as poor, with one small winery respondent recently abandoning their web site for lack of use. Lack of time to support e-business processes was also mentioned by eight small winery respondents as a barrier.

5.7 Summary

The analysis of the survey data has resulted in a detailed description of the current nature and extent of e-business adoption by Australian wineries. Winery size appears to be a significant moderating factor in how e-business is adopted and used by wineries. Factors influencing the adoption and use of e-business processes vary in their level of impact between different e-business process domains. The online activities of both supply chain organisations and the Australian Government appear to exert some level of influence on the e-business activity of many Australian wineries. Further discussion and conclusions are provided next in chapter six, along with implications for practice and theory.

6 Conclusions and Implications

6.1 Introduction

As outlined in chapter one, this dissertation reports on empirical research into the nature and extent of internet-enabled e-business adoption by Australian wineries. The purpose of the report is to arrive at a better understanding of the factors acting as drivers and barriers of e-business adoption rates by examining the behaviour of wineries and the reasons for that behaviour. The overall research question reads:

What is the nature and extent of internet-enabled e-business adoption by Australian wineries, what factors affect this adoption, and why is this so?

In chapter two previous studies into the factors influencing adoption by organisations of innovations in general were briefly reviewed. The focus of the literature review then narrowed to examine the adoption by organisations of information technologies in general, then e-business in particular, followed by the adoption of e-business processes by Australian wineries.

Chapter three described the two research methodologies used for the two distinct stages of empirical data collection. First, a pilot study using semi-structured interviews was conducted with representatives from nine wineries in order to discover the issues and factors related to adoption of e-business processes which seemed to be of most importance. The interviews were recorded and then transcribed. As well as the individual interview transcriptions, a matrix of interview data was created on a thematic basis in order to facilitate cross-case analysis. Second, a self-administered mail questionnaire was developed in order to conduct a census survey of all Australian wineries processing more than 20 tonnes of grapes annually. A survey instrument was designed based on literature and interview findings. Pretests and a pilot test of the questionnaire were conducted in order to increase the validity and reliability of the instrument. A single mailing was conducted, with selected follow-up undertaken by telephone contact. Responses were entered into SPSS for statistical analysis, and sight checked for data entry errors. The final overall response rate from the population of Australian wineries was 18.6%, with the response rate generally increasing with winery size in a range covering from 15% of

small up to 46% of the very large winery population. Confidentiality was guaranteed to all interview and survey respondents because of the possible commercial sensitivity of information provided.

An analysis of the interview data from the pilot study is reported in chapter four. Individual interview summaries are followed by a cross-case analysis of the collective information. The information helped to identify the e-business process domains which were being used by wineries, a number of key factors influencing the e-business adoption activity, as well as a number of common barriers raised by multiple interview respondents. The combined information from the interviews and the literature review then led to the selection of the following four factors for further study of level of influence: 1) relative advantage; 2) resource capacity; 3) supply chain; and 4) government. Four propositions were also developed for testing based on empirical data gathered in the survey stage of the research. The purpose of the self-administered mail questionnaire was to gather data on e-business activity within various e-business process domains, the level of influence of the four selected factors in each of those domains; the impact of possible barriers, and to allow for the propositions to be tested.

Chapter five reports on the analysis of the survey data, with various statistical tests used. A modified winery size classification system was developed, and test results are reported by winery size when statistically significant different results by winery size occur. As well as analysis of the nature and extent of e-business adoption in each e-business domain, and of the possible barriers, the chapter includes results for each of the four proposition tests.

In this final chapter, conclusions are drawn regarding the research question and related propositions. The level of influence of the selected factors is considered. This study's contributions and the implications of its findings for Australian wineries and other similar organisations and industries are then discussed. The final sections comprise limitations of the study and suggestions for further research.

6.2 Conclusions for research question

In this section, the nature and extent of e-business adoption by Australian wineries is summarised, and conclusions are made about each research proposition, and placed within the context of previous research.

6.2.1 The nature and extent of internet-enabled e-business adoption by Australian wineries

The census survey provides the main source of empirical data for describing, in detail, the nature and extent of internet-enabled e-business adoption by Australian wineries. The response rate to the national survey was acceptable, ranging from 15% of small wineries up to 46% for the very large wineries, and relatively equally spread across all wine producing states. The fact that these percentages relate to the total population of Australian wineries rather than just a sample means that the survey responses provide very strong empirical evidence upon which to base comments and analysis.

Findings from the literature review and from information gathered during the pilot study interviews suggested that winery size was a likely moderating factor on e-business activity. Hence the analysis of the survey results included tests for significant differences to responses by winery size. A contribution of this research is the inclusion of the very large size category. Previous research into business behaviour of Australian wineries, including e-business related research, has generally treated all wineries processing more than 1000 tonnes of grapes annually as belonging to the same size group. This has not particularly mattered when the research has focussed on small and medium sized wineries only. However this research, which included the full range of wineries except for the micro organisations, required a greater degree of precision in distinguishing between the larger organisations. Discussion in section 5.1.1 of chapter five demonstrated that the top group of approximately twenty five wineries are very different from the other large wineries by their sheer dominance of the whole Australian industry in terms of economic and production output. The ensuing analysis has vindicated the inclusion of the very large category, as frequently it has been the activities of this group which have shown up some distinctive behaviour. The nature and extent of internet-enabled e-business by Australian wineries is now summarised.

E-mail

Empirical results from the questionnaire confirm the growing importance of e-mail as an increasingly used communication medium for Australian wineries. E-mail, described by an interview respondent as 'ubiquitous', is replacing faxes and letters in 80-90% of wineries, while telephone calls are being reduced in approximately two

thirds of wineries. E-mail is now widely used across the whole supply chain, with usage levels near 90% for communication between wineries and other wine industry associations, business customers, individual customers and suppliers. The usage levels are lower for winery communication with government agencies and departments, but are still high at 75%.

Winery communication via e-mail with business partners occurs significantly more in large and very large wineries than it does in small and medium wineries, with a likely explanation being that the larger the winery, the more likely they are to have business partners, and hence the more likely the need for communication with this group. The same trend of greater use by larger wineries is magnified even more for e-mail usage between internal winery staff. Nearly all large and very large wineries use e-mail for internal communication, while only approximately one third of small wineries and two thirds of medium sized wineries are using internal e-mails. The finding that face-to-face communication is being replaced to a much lesser extent in small and medium wineries than in large and very large wineries is consistent with this trend. With smaller staff levels in smaller wineries and correspondingly lower levels of internal communication these differences are not surprising. The survey responses confirm that on average small wineries perceive e-mail to be less important than their larger counterparts, have fewer resources than larger wineries to support e-mail use, and are less likely to prefer using e-mail over other types of communication.

External web sites

Australian wineries use the Web to access sites of external organisations for a wide range of purposes, but usage levels by small wineries, and to a lesser extent the medium wineries, are significantly less than those of the large and very large wineries. While in general the usage levels are increasing, with most respondents indicating that finding information via the web is proving to be faster and easier than alternatives, survey results showed that these perceived benefits are significantly less for small wineries. However, the reason for this difference is not immediately apparent. There was no significant difference between the winery sizes in their responses to the influence of time, opportunity and internal resource capacity on their use of external web sites, or from the influence of the actions and web site functionality of other supply chain organisations. Thus resource capacity and supply

chain influences are not indicated as having significant explanatory power in understanding the difference in the adoption levels. Small wineries show significantly less awareness of the influence of government-related activity than do the larger wineries on their e-business operations, but whether or not there is an association between the different perceptions of government influence and the different perceptions of relative advantage is not clear.

Survey results show that the most common reason for wineries to use the Web is research – in particular, governance research related to the industry and to government regulations and compliance. Supply-related research is also widely used, but research of the distribution end of the supply chain is less so, possibly because distribution relationships and arrangements are relatively stable and so there is reduced need to investigate change. About 50% of exporting wineries indicated they were using the online wine export approval process, while just over 20% were using online processes for customs clearances. However in both cases, the difference in usage levels varies significantly by winery size, with small and medium wineries much less likely to be using online transaction processes than the larger wineries. With regard to online processes for customs clearances, the survey demonstrated that only the very large wineries were particularly aware of the impending changes to the way customs clearances would be processed in Australia in the near future. It is not surprising therefore to observe that long delays have been experienced in the adoption of the new online system by Australian Customs, moving from an initial expected cutover date in September 2003 to December 2003 and now delayed until October 2004.

Of particular interest in this study is the adoption and use of electronic product catalogue systems such as EANnet by wineries, and the reasons for that adoption. The issue arose from empirical information gathered during the pilot study interviews when a number of interview respondents mentioned their use of EANnet as an example of one of their e-business processes, and gave the reason for the adoption as meeting the requirements of their large retail customers, in particular Coles and Woolworths. The survey responses indicated that approximately a quarter of wineries are using electronic catalogue systems to hold their product data for access by business customers. The percentage rises significantly as the winery size increases, from approximately 20% of small wineries up to 60% of very large

wineries. Just over half of those who have adopted the online catalogue systems indicated that pressure from major business customers was the reason. While no statistically significant difference in the response by winery size was found, all of the very large winery respondents indicated that pressure from major retail customers was the reason for their adoption. This finding accords with information gained from the interviews conducted in very large wineries, and provides strong and confirmatory evidence that pressure from major customers is an influential factor for at least some of the e-business behaviour by Australian wineries. Also, it suggests that the network externality characteristic of e-business is being exploited by powerful organisations to raise the numbers of users of particular e-business processes in order to maximise the benefit for those powerful groups, possibly at the short term expense of wineries, a behaviour observed in previous research literature and discussed in chapter two, section 2.3.2.

Thus supply chain influence appears to be more significant in explaining some of the e-business adoption by wineries than the perception of relative advantage. Further discussion on the theoretical implications of the network externality characteristic of e-business is provided in section 6.2.2.

Winery B2C web site

Analysis of the empirical evidence from the survey has revealed that some significant differences exist between the purpose and motivating reasons for adopting B2C web sites by Australian wineries, and that these differences are associated with size and related market position. The subsequent nature and extent of adoption outcomes and perceptions of benefits delivered also vary as a result, as discussed next.

While all wineries share the same degree of motivation of promoting their winery organisation and products to a global audience, and supplying purchasing information from existing distribution and retail outlets, they do not share the same motivation of selling to individual consumers. In particular, it is the very large wineries that demonstrate the major point of difference. Whereas approximately 70% of the small, medium and large wineries cite increasing cellar door sales as a motivating reason for adopting their B2C web site, only about 20% of the very large wineries do so. The difference is even more striking when it comes to online sales, with almost no very large wineries interested in developing an online sales channel

compared with 35% of large and 65% of the small and medium wineries. From the interviews it was found that the major reason why the very large wineries choose not to offer online sales is because of the need to avoid conflict with their powerful business customers. See chapter four, section 4.3 for the related discussion. The survey responses provide additional support for identifying the actions of supply chain organisations as an important factor that impacts on adoption levels. However, the survey responses also demonstrate that a lack of priority, likely to be related to a lack of perceived relative advantage, also contributes to the level of non-adoption of online sales options.

Survey results revealed that online wine sales results have been lower than management expectations in about 80% of cases, which represents a high level of disappointment with the Web as an additional market or sales channel. Given that the smaller the winery the more likely it is to offer online sales, then the poor results provide a likely explanation of the lower perception of benefit from B2C web sites experienced by the smaller wineries. In contrast, the larger the winery, the more the site is used to support existing distributors and retailers in order to avoid conflict with major business customers instead of being used as a sales medium. Benefits delivered from this strategy are more difficult to measure, and possibly less likely to disappoint as a consequence. However, despite the variable levels of benefits experienced by different size wineries, most of the respondents perceive their web sites to be an important part of their company's business strategy.

The perception of relative advantage of B2C web sites does not emerge as being particularly strong, with most respondents indicating that, while the sites have produced some marketing benefits, other promotional methods have shown greater effectiveness. As far as the influence of perception of resources goes, most respondents, regardless of winery size, agreed that resource shortages limit their web site functionality. However, the larger the winery, the more likely they are to use outsourcing options as a way of overcoming any lack of internal expertise. Influence from government activity appears to have little influence on the B2C e-business activities of wineries, which is not unexpected as the purpose of B2C web sites has little connection with regulation compliance.

The impact level of supply chain influence did not emerge from the survey results as a particularly strong factor in influencing B2C web activity, despite indications that

this was the case during the pilot study interviews. However, the survey did provide quantitative support that supply chain influence declines as winery size declines. One possible explanation relates to the balance of power in the relationships between wineries and their business customers. The speculation is that the very large business customers such as Coles and Woolworths and large distribution firms wield far greater power over the large and very large wineries than the other business customers do over the small and medium sized wineries. This speculation is supported by qualitative information gathered during the pilot study interviews: see Table 4-2 in chapter four for relevant interview comments.

Extranet and Intranets

While approximately half of the interviewed wineries had either an intranet or extranet or both, the census survey results revealed a much lower level of adoption of these types of web sites than the interview frequencies suggested. This finding alone provides a useful contribution to understanding the nature and extent of e-business adoption by Australian wineries. Some descriptive trends are observed.

Extranets are mainly used to provide self-service of information to business customers, with relative advantage and influence from the supply chain both indicated as influential factors. The need to supply data to supply chain partners is a driving factor in the decision to build extranet sites. Extranets make it easier for other organisations to do business with the winery by improving the flow of business information to others and reducing the costs of supplying that information.

Larger wineries appear more likely to have an intranet than smaller wineries, which is not surprising as the relevance of this type of site increases with organisation size and geographic spread. Intranets are used to distribute the latest business news, policies and procedure to internal staff. For most wineries deciding to adopt and use an intranet, expected benefits are met or exceeded, and the intranets are considered to be an important part of their business strategy.

Unfortunately the numbers of adopters of extranets and intranets are too low for any quantitative analysis of trends connected with these types of web sites to be made. Thus very little in the way of conclusions can be made other than to say the adoption levels of these e-business processes are extremely low, but that on average the benefits are generally favourable.

Barriers

Empirical evidence from the census survey revealed that software costs, the limitations of available network speeds, and network connection costs are the three most common barriers to further e-business adoption by Australian wineries, with 40-50% of respondents citing these three factors. These three barriers apply to wineries regardless of organisation size. Thus limitations of the external network infrastructure and the costs associated with accessing and using the network inhibit growth of e-business adoption by wineries more than any of the other barriers faced. The dominance of these barriers over others is likely to be related to the fact that most wineries are situated in regional locations where broadband access is commonly not yet available.

The Australian Government recognises their responsibility for improvements in network infrastructure, and has recently developed a national broadband strategy in partnership with state and territory governments. Objectives of the national strategy include the development of a coordinated approach to future network development in order to reduce price and location barriers, and in particular to provide affordable broadband services in regional Australia (OIE 2004). This research confirms that improvements in network infrastructure quality and lowering of associated costs is needed in order to reduce the most common barriers facing Australian wineries in the adoption of e-business processes.

6.2.2 Factors affecting e-business adoption, reasons, and related propositions

Research findings from this study have some implications for theory related to adoption of e-business practices. The implications of findings related to the propositions tested in chapter 5, section 5.5, are now considered.

The first proposition, that the nature and extent of adoption of e-business processes by wineries differs significantly by winery size, was supported. Many instances of significant differences between e-business behaviour by winery size were found, with these discussed in detail in section 5.5.1. Theoretical implications follow from the patterns observed between adoption practices that are related to winery size and which are not purely a consequence of increased scalability of larger organisations. For example, relationships between winery size and winery customer types (business versus private) appear to influence winery web strategies. Larger wineries are more

likely to have powerful business customers, and as a consequence they are more likely to avoid conflicts of interests with regard to selling online direct to consumers. Also, larger wineries are more likely to reactively adopt some e-business practices (for example, online product catalogues such as EANnet) at the behest of large business customers than the smaller wineries who are not subject to the same type of customer pressure. Smaller wineries with a customer base of mainly individual consumers appear to enjoy greater freedom in selecting the e-business B2C strategy of their choice. However, the success of the outcomes for these smaller wineries is highly dependent on adoption of the online processes by individual consumers, and thus far the benefits are well below expectations for Australian wineries. Findings from this research with regard to low online sales for wineries and the need to avoid conflict with existing customers and distributors agree with findings made by Sellitto and Martin (2003), reviewed in chapter two, section 2.4.3.

This research found that smaller wineries perceived less benefit from and have less resource capacity to support e-business adoption than their larger counterparts. They also feel less pressure from government influence to adopt online behaviour to support communication and compliance. These results are in contrast with the finding by Daniel and Grimshaw (2002), discussed in chapter two section 2.3.2, that small organisations perceive greater benefits from e-business processes than large organisations. The wine industry specific context of this research compared with the multiple industry coverage of the Daniel and Grimshaw study may account for the different findings, as well as the Australian versus UK contexts. However, the difference in the outcomes with regard to the influence of organisation size does indicate that the effect of organisation size on e-business adoption and outcomes requires further research before theoretical generalisations can be made with confidence.

The second proposition speculated that the factors influencing e-business adoption levels do not impact in the same way in different e-business process domains. The survey evidence provided strong support for this proposition. Relative advantage, for example, has significantly less influence in the use of B2C web sites than it does for e-mail or the use of external web sites. Resource capacity affects usage of e-mail more than web sites, while the activities of supply chain organisations have less impact on winery B2C web sites than for e-mail and external web sites. Influence

from government is particularly low for winery B2C web sites, but is much higher with regard to e-mail use and external web sites. It is interesting to note that online government activity is, on average, viewed as a stronger influential factor on e-business activity in general than either relative advantage, internal resource capacity or the actions of other organisations in the winery supply chain.

Theoretical implications of different impact levels for different factors in different e-business process domains exist in relation to complexity of models and frameworks. The conceptual models covering e-business adoption tend to collect all influential factors that are indicated in any e-business situation (Chau & Turner 2001; Chong & Bauer 2000; Daniel & Grimshaw 2002; Gibbs, Kraemer & Dedrick 2003; van Akkeren & Cavaye 1999; Wu, Mahajan & Balasubramanian 2003), and the models risk decreasing relevance as a result because of the difficulty of applying the models in specific situations. One possible solution to this problem is to customise theoretical frameworks for specific e-business process domains, rather than to continue developing ever more complex models which include factors for all possible situations to cover all potential types of outcomes. However further research in specific domains will be needed before these customised frameworks can be developed.

Partial support was found for the third proposition, that the nature and extent of e-business process adoption by wineries is influenced by the activities and perceived reactions of other organisations in the wineries' supply chain. In particular, powerful business customers were found to dictate some e-business adoption by wineries for their own benefit and to influence winery B2C online strategy with regard to avoidance of online sales to consumers. Also, the lack of e-business adoption by suppliers accounted for the low rate of e-procurement among wineries. The dependence of e-business adoption by one organisation on the actions of other organisations is directly related to the network externality characteristic of e-business, where a positive correlation exists between increasing benefits and increasing numbers of users. One effect of this characteristic is that encouraging or forcing an increase in user numbers constitutes a mechanism by which powerful stakeholders in the network can increase their own economic benefit. Stakeholder power is related to the market type, discussed briefly next.

For example, in an oligopoly - a market with few sellers - the power largely resides with the sellers. The soft drink industry is an example of an oligopoly, with Coke, Pepsi and Cadbury-Schweppes dominating most world soft drink markets. On the other hand, in an oligopsony – a market with a few large buyers – the power largely resides with the buyers (Hannaford 2003). While the domestic sector of the Australian wine market cannot yet be described as an oligopsony, concern has been voiced by the Australian Competition and Consumer Commission (ACCC) over the increasing power of the two largest Australian supermarket retailers, Coles and Woolworths as the two dominant domestic buyers of Australian wine (Needham 2003). In the year 2003 Coles and Woolworths collectively controlled more than 1000 liquor outlets in Australia and a third of national liquor sales (Sexton 2003). Restriction on the number of liquor sales licences in Australia is contributing to the pattern of consolidation in the domestic wine retail market, since the major mechanism by which large supermarkets can expand their liquor retailing activities is through the acquisition of existing licences (Needham 2003). At the retailing end Coles and Woolworths increasingly control domestic national liquor sales, and in particular they control the sale of branded wine from the top wine companies who are able to supply sufficient quantity. For example, in 2002-03, 42% of the wine from Australia's largest wine company, Southcorp, was sold via supermarkets (Needham 2003). Supermarket customers in major export destinations (e.g. Tesco and Sainsburys in the UK) also wield considerable customer power when it comes to purchasing Australian wine, and they also put downward pressure on prices of Australian wine (Milne 2003). The power of the giant supermarkets as major retail customers is influencing e-business adoption behaviour by Australian wineries, although it is likely to only apply to the medium and larger size wineries that produce wine in sufficient quantities to satisfy the needs of large supermarket customers. Pressure from the supplier end of the winery supply chain is minimal due to the lack of e-business activity by suppliers.

The findings from this research in relation to the influence from supply chain organisations have several theoretical implications. First, the work confirms that customer power is an important factor influencing e-business adoption and associated strategy of Australian wineries. Customer power is linked with customer type and size, and further research into the influence of customer type (for example,

business versus private, small versus large) may contribute to an increased understanding of the interplay between networked organisations in a supply chain and the forces acting between them with regard to use of e-business processes.

A second theoretical implication relates to the network externality characteristic of e-business where benefit increases as the number of users increases. When power is unevenly distributed amongst supply chain organisations, then those organisations with power can force adoption of e-business processes by others as a mechanism to increase their own benefit. The adoption of EANnet by wineries as a result of pressure from large retailers provided an example of this type of behaviour. The network externality characteristic might need to be added to the set of innovation characteristics in DOI theory in order to take this potential factor of influence into account. A modification of the factors identified in DOI theory and originally presented in Figure 2-2 of chapter two is now presented in Figure 6-1 to illustrate the suggested change, with a sixth innovation characteristic added and shown in bold.

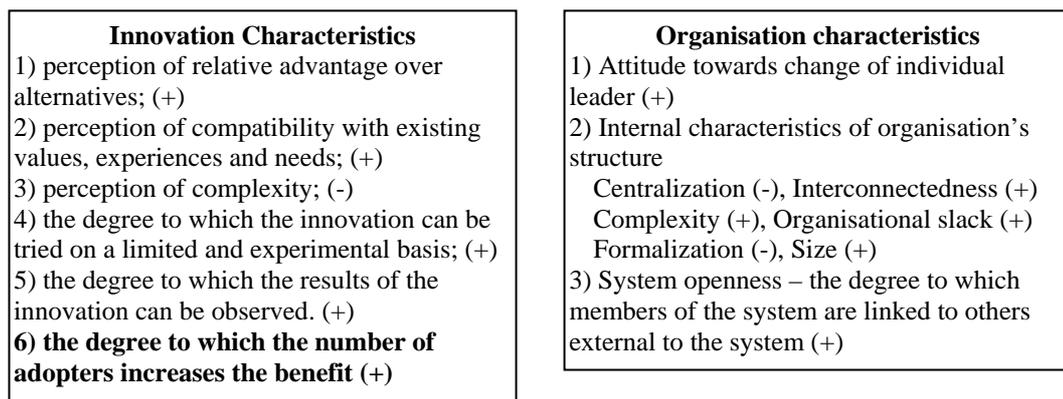


Figure 6-1 Modified set of innovation characteristics based on DOI theory

Finally, government influence on e-business adoption via the provision of government online services and compliance processes, the subject of the fourth proposition, is now considered for theoretical implications. The empirical evidence supported the proposition that online government services and compliance processes act as an influential factor on e-business adoption. However, government influence applied in only some of the process domains: namely, e-mail and external web sites, but had little influence in the functionality and purpose of winery web sites. Also, the survey results indicated that the level of impact of government influence was felt less by small wineries than their larger counterparts. This work supports findings, summarised in chapter two, section 2.3.2, concerning the important role of

government in enabling conditions supportive of e-business take up, and of e-government services as helping to drive adoption (Gibbs, Kraemer & Dedrick 2003; Palacios 2003; Wong 2003).

The main theoretical implication of this finding is that greater recognition of government influence needs to be made in explanatory models and theoretical frameworks covering e-business adoption, at least for Australian conditions. For example, a suggested modification of the conceptual model of the antecedents and performance outcomes of e-business adoption developed by Wu, Mahajan and Balasubramanian (2003) that was presented in chapter two, section 2.3.3, is given in Figure 6-2 with changes formatted in bold. The modifications include: the addition of regulatory environment factors, with the provision of e-government services and compliance processes identified as two key components; changing the competitive environment factor of customer power to supply chain power in order to acknowledge that the power is not necessarily held by customers in all situations; customer type included along with customer orientation; and organisation size to the firm characteristics as size has additional influential possibilities other than as a control variable for scalability effects. Also, the process domains used in this research to investigate the nature and extent of e-business adoption have replaced the domains used to describe the intensity of adoption in the original model, shown in Figure 2-3.

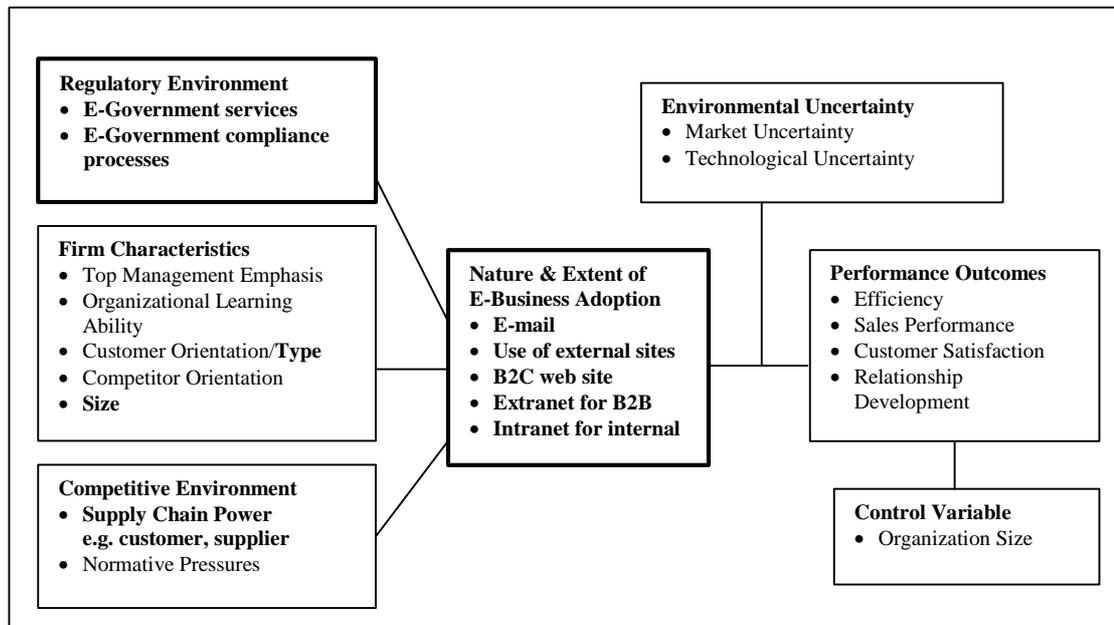


Figure 6-2 Modified conceptual model of antecedents and performance outcomes of e-business adoption, based on work by Wu, Mahajan and Balasubramanian (2003, p. 429)

6.2.3 Implications related to practice

In chapter one, in setting the foundations of this study, discussion was presented on the Australian Government's perception of the e-business adoption levels as being too low for the benefit of the Australian economy, particularly among small and medium sized organisations. This research into the e-business adoption by Australian wineries has demonstrated that small and medium wineries experience, or at least perceive, less benefit from the adoption of e-business processes than larger organisations. Part of the reason for this outcome is related to the lack of relative success these organisations have experienced with trying to use the web as an additional sales channel for market growth. The criticism of small and medium sized organisations as not appreciating the business opportunity afforded to them by e-business appears to be harsh and perhaps even misplaced in the case of Australian wineries.

The research provides evidence that the level of benefits espoused in government funded reports is greater than many wineries have experienced in practice, and this is particularly the case for those of small and medium size. The lack of e-procurement activities are explained by the lack of online purchasing options from suppliers. Also the costs of accessing the network and obtaining acceptable speeds to support e-business processes are confirmed as significant barriers to further adoption levels.

Solutions which address these barriers lay at the feet of government rather than the wineries themselves. In practice, many rural and regional Australian businesses, particularly small and medium sized, will not have sufficient resources to adopt many e-business processes until the cost of their Internet access is lowered and the quality and speed of access is markedly improved. The cost burden associated with wineries providing their own technical solutions to the lack of broadband access as described in Chapter Four is too great for most ASMEs to bear. If the Australian Government is serious about increasing e-business adoption by ASMEs then it will have to address the current deficiencies of broadband access in rural and regional Australia.

The e-business strategies of large and very large wineries are more heavily influenced by the actions of other organisations in their supply chain than the smaller wineries, and in particular by the pressures from large business customers to adopt e-business practices and strategies which improve the efficiency of the business customers and do not threaten the business customer's control of the final end consumers. Thus, characteristics of winery customer types and their internet-related behaviour have an influence on e-business adoption levels and strategies. One implication for wineries is that their size and market position is likely to influence the role e-business plays in their business strategy. Thus in practice a winery must tailor their e-business practices to suit their business strategy and their customer type. In general small and medium sized wineries have greater freedom to select the e-business strategy of their choice than their large and very large counterparts because of non-existent or lower pressure from business customers. However the general lack of success in online sales or sales facilitated by winery web sites indicates that the time has not yet come for small and medium sized wineries to rely on this mechanism for increasing market share. Instead, e-business appears to have greater success as a marketing tool, and for increasing efficiency and lowering cost in relation to online compliance processes.

6.3 Limitations

A number of limitations in this research are acknowledged. The empirical data gathered in both the pilot study and the survey stage have relied on single informants

from each winery organisation, as discussed in chapter three, section 3.4. This approach does not provide an opportunity to cross-check information gained concerning an individual organisation in order to increase the reliability of collected data. However, for the purpose of this research the collective information, sourced by both qualitative and quantitative methods from industry participants very familiar with e-business strategy and management issues, does constitute a valid source of empirical data upon which improvements to understanding e-business adoption can be based. Future research could address this limitation by collecting data from multiple informants from each organisation.

Second, there has been no opportunity in this research project to collect longitudinal data, and thus the findings represent a snap-shot in time, thus making predictions based on time trends in behaviour difficult. While some information on change of e-business adoption levels over time was gathered from both the interview and survey respondents, the information is general and imprecise in nature. A follow-up research project would provide a chance to collect detailed longitudinal data and increase opportunities to analyse trends in behaviour by time as well as by organisation characteristics such as winery size.

Third, the reliability of some of the findings are limited by the relatively low Chronbach alpha scores for the supply chain factor statements in particular, reported in section 5.5.2 in chapter five. The need for caution in interpreting those results is thus repeated. The need for improvements in the internal reliability of measures developed to test influence of the supply chain factor in further research is acknowledged. Improvements in the internal reliability of factor statements designed to measure influence of resource capacity and government activity is also needed.

The pro-response bias to the survey from those wineries using some level of e-business, discussed in section 5.1.2 of chapter five, also limits the generalisability of the findings to the remainder of the Australian winery population, and particularly to those wineries who have not yet adopted e-business processes at all. While it would have been useful to have had a greater return rate from those wineries not yet using the internet, and to have gathered more information on what constitutes the main barriers in these cases, this did not eventuate.

6.4 Further research

In the course of investigating the nature and extent of e-business adoption by Australian wineries, the impact of perceived relative advantage, resource capacity, and influence from supply chain organisations and government was investigated separately in different e-business process domains. While the impacts of relative advantage and resource capacity have been well researched previously, the impacts of supply chain and government behaviour have had less attention. This research confirmed that both supply chain behaviour and government activity do act as influential factors in some, but not all, e-business process domains. Further research into both of these factors will improve the understanding of the related mechanics of their influence. Improved measurement scales for these factors will need to be developed to address limitations of this research.

The introduction of the new 'Integrated Cargo System' (ICS) by the Australian Customs Service in October 2004 not only promises to enhance Australia's efficiency with regard to exports and to enhance Australia's risk management and assessment, it also affords a valuable opportunity to research the effects of introducing a high level of online compliance that includes use of public key infrastructure (PKI) for evidence of identity purposes. While online compliance will not be strictly mandatory, the manual alternative of presentation of evidence of identity documentation at selected Australia Post offices has extra cost burdens, and mail and fax options will not be possible (Australian Customs Service 2004). Thus, the online compliance process is likely to be adopted by most exporters because of the lower costs and greater efficiency benefits. Two distinct research opportunities thus present themselves.

First, further study of Australian wineries conducted six to twelve months after the ICS is live will enable the before and after effects of the online export compliance process to be investigated. Also, the detailed data collected for the purpose of this current research will provide a point of comparison and allow investigation of whether increased influence from online government compliance activity contributes to increased e-business adoption in other areas.

Second, a multiple industry study into the effects of the new ICS on e-business behaviour in Australia, and effects of increased numbers of organisations with digital

certificates for evidence of identity purposes, would also increase understanding of the role that these factors play in e-business adoption behaviours.

6.5 Summary

This chapter summarised the main findings and implications of the research. The nature and extent of e-business adoption by Australian wineries was described, and the implications of the results with regard to both theory and practice were discussed. A number of limitations of the study were identified along with areas of future research.

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Appendix A The Australian Wine Industry

A brief history of the Australian wine industry, along with some analytical comment on its nature, is presented in this chapter to provide both background and context for this research into the adoption factors of e-business by wineries. A brief overview, in section A.1, of the beginnings of the wine industry during the pre-Federation years is followed by an examination, in section A.2, of the development of wine as a national agricultural industry; the regulatory environment that developed alongside it; and the contributions made by various stakeholders during the first eighty years of the twentieth century. The success factors behind the realisation of the industry's target of \$1 billion annual export wine sales by the year 2000 are explored in section A.3. Section A.4 investigates the strategies the industry is currently employing to achieve its target of \$4.5 billion in annual export sales by the year 2025, as described in the wine industry's Strategy 2025 vision statement (WFA & AWBC 2000, p. 13). The chapter concludes, in section A.5, with comments on the current and possible future roles of the Internet and e-business within the Australian wine industry.

A.1 First Fleet to Federation, 1788 - 1900

Some of the significant milestones of the first 112 years of the Australian wine industry are briefly described in this section, covering the period of colonial Australia. Also, the 'new world' wine making conditions are compared with those found in the traditional old world European countries such as France, Italy and Spain.

A.1.1 Early vision of wine export trade with first plantings

From the start of white colonisation of Australia, with the arrival of the first vines on the First Fleet in Sydney Cove in 1788, hopes of a successful wine industry in Australia flourished. Captain Arthur Phillip RN, first governor of NSW, wrote "*...the wines of New South Wales may perhaps here after be sought with civility and become an indispensable part of the luxury of European tables...*" (Beeston 2001, p. 1). The first recorded wine export occurred in 1822 by Mr Gregory Blaxland, who sent a quarter-cask of red wine to London to be judged by the Royal Society of Arts, in the hopes of winning Australia's first medal for wine. The wine was awarded a silver medal, and judged to be "*...by no means of superior quality, yet it affords a reasonable ground of expectation that by care and time it may become a valuable article of export.*" Blaxland's second shipment of wine to London's Royal Society of Arts was further rewarded in 1828 by Australia's first gold medal for wine (Beeston 2001, p. 13).

The NSW Hunter Valley was the first area to be developed as a wine-growing region with 570 acres of vines by 1850. The second colony to have vine plantings was Tasmania. Between the 1820's and 1850 vineyards were planted at Windemere on the river Tamar and at Falmouth and Breadalbane, but by the middle of the century the production of wine in Tasmania had ceased, possibly due to the lack of skilled labour and a market, as well as difficulties in managing the cool climate (Beeston 2001). By the time Victoria became an independent colony in 1851 numerous small vineyards were planted in Melbourne, Geelong and the Yarra Valley. The convict-free colony of South Australia too was emerging as a wine-growing region, with the first commercial vineyard planted at Underdale, west of Adelaide, between 1837 and 1840. Many German immigrants settled in the Barossa Valley area, contributing both their vigneron experience and their Rhine Riesling variety of vine, which flourished in the area. In 1850 for example, Johann Gramps' Jacob's Creek vineyard produced sixty-four litres of hock-style white wine (Beeston 2001, p. 42).

A.1.2 Conditions for wine production

Australian wines are commonly labelled 'new world', as compared with the 'old world' of France, Germany, Spain and other European wine producing countries. The significance of being a new world wine producer as opposed to old world is many faceted. At a very basic level it means Australian wine production started with a clean slate as far as history and tradition goes, with European concepts such as the influence of "terroir" on exactly where specific types of grapes could be grown simply not relevant.

Terroir is a French term describing the complete package of environmental factors such as climate, soil and landscape and their many combinations. In France, the vineyards and their crops are classified and restricted by both terroir and tradition, producing an appellation system of wine production that is based on strict control of all stages between grape and glass. In Australia however, with the wine industry starting from scratch, there was no rule to follow on which varieties of grapes could or should be grown in which regions of the country, no existing formulas or historical precedence relating to how many acres of red or white varieties to plant, and no rules on how the wine should be made. Each decision made in the vineyard, such as which variety to plant and where to plant it, was a conscious decision made with complete freedom. Progress was made by a combination of old world experience, trial and error, and innovation (Halliday & Johnson 1992).

A.1.3 Boom periods for Australian wine

The last half of the nineteenth century saw growth in the wine industry in most colonies for a variety of reasons. For example, the discovery of gold in NSW and Victoria brought a rush of immigrants which trebled the population in the 1850's and brought a consequent increase in both the market size and its purchasing power. Increased demand led to increased vine plantings in NSW and Victoria, and by 1876 the NSW wine production had risen to 3.78 million litres. There was also significant growth in South Australia's production, with the establishment and consolidation of several new regions such as McLaren Vale, the Adelaide Hills, the Barossa Valley and the Clare Valley. For the 17 year period between 1854 and 1871 the number of acres under vines in Australia increased by an average of 15.5% per year, largely driven by the growth in domestic demand. However, for the following 10 years from 1871 to 1881 the total vine acreage decreased by an average of 1.1% per year as a result of over-supply and the cost and difficulty of selling wines to non-domestic markets (Anderson 2002).

While this period of contraction cannot really be described as a bust, it is certainly a time when the industry had to change into a defensive or neutral position in response to supply suddenly exceeding demand. The reasons were related to the difficulty of developing new markets. Wine sales between Australian colonies were subject to very high tariffs, and as a result, little wine was sold outside the colony in which it was made. Wine exports to England and other countries were also hampered by problems, with much of the wine shipped in speculation of a sale rather than being guaranteed of a sale, and no measures taken to monitor and protect wine quality during the voyage and the subsequent warehousing while waiting to be sold (Beeston 2001, pp. 73 & 85). Poor marketing skills, lack of reliable agents and problems with the long-term quality of the wine contributed to the problems experienced by the industry during this stage.

The Australian wine industry has repeatedly followed a cyclic pattern of boom years followed by lengthy periods of levelling off as the supply/demand curves struggle to come into balance. These cycles have been identified in work by Anderson & Osmond (1998), and are summarised later in section A.2.1. The second boom in plantings and production began in the 1880's with a growth in both domestic demand and export demand by the British which was mainly for bulk dry red wines. Conditions for exporting also improved with lower transport costs and a more reliable market (Anderson & Osmond 1998). However, sales between the colonies were still restricted because of the high tariff-related costs involved.

A.2 Consolidation after Federation, 1901 - 1980

With the advent of Federation came the end of tariffs and the development and growth of wine as a national industry, discussed briefly in section A.2.1. The emergence of several industry bodies as a strategic response to manage the various threats and opportunities that presented themselves to the industry during the first eighty years of the twentieth century are discussed in section A.2.2.

A.2.1 Development of a national domestic market

Federation began with the adoption of the Commonwealth of Australia Constitution Act on the 1st of January 1901. Colonial tariffs were abolished with the change from colonies to states, allowing wine to be freely marketed throughout Australia for the first time. Wine quickly emerged as a growing agricultural industry, and one that was ripe for restructuring and expansion. Wineries were able to operate interstate branches, and to buy and manage interstate vineyards.

South Australian wine companies in particular took full advantage of the increased freedom of the political and regulatory environment, expanding both their size and production through interstate acquisitions and new plantings in South Australia. For example, the volume of South Australian wine sold interstate rose from 0.1 million litres at the start of Federation to 2 million litres by the early part of the First World War in 1915 (Beeston 2001, pp. 140-1). Export sales of Australian wine to the United Kingdom also continued to increase during this time, taking account of about one-sixth of the total production. While market conditions seemingly improved on a number of fronts, the actual area under vine decreased slightly during the period of 1896 to 1915 in Australia. Only in South Australia did this trend reverse, with per annum increases of 1.9% for vine acreage and 4.8% for wine production for the same period of 1896 to 1915 (Anderson & Osmond 1998).

Anderson (2002) identifies four previous major boom/plateau cycles in the Australian wine industry, and these are summarised in Table A-1, along with the fifth and current boom period which is further examined in section A.3.

Table A-1: Booms and plateaus in Australia's wine industry, from 1854-2000

Vintages	Boom/ plateau cycle no.	No. of years	Increase in vine area (% pa)	Increase in wine production (% pa)	Increase in wine export volume (% pa)	Share (%) of wine production exported	Domestic per capita consumption (litres pa)
1854-1871	1 st boom	17	15.5%	18.4%	14.1%	1.8%	na
1871-1881	1 st plateau	10	-1.1%	-0.6%	-5.2%	1.6%	na
1854-1881	1st cycle	27	8.4%	10.7%	8.2%	1.7%	na
1881-1896	2 nd boom	15	9.7%	7.5%	23.0%	9.8%	na
1896-1915	2 nd plateau	19	-0.1%	-0.4%	0.4%	16.5%	5.1
1881-1915	2nd cycle	34	3.9%	3.3%	8.7%	14.4%	na
1915-1925	3 rd boom	10	7.0%	12.7%	4.5%	8.5%	5.8
1925-1945	3 rd plateau	20	0.9%	0.1%	-1.2%	16.4%	4.0
1915-1945	3rd cycle	30	2.4%	3.6%	4.9%	14.9%	4.7
1945-1968	Slow growth	23	0.2%	2.1%	0.2%	5.4%	6.2
1968-1975	4 th boom	7	3.3%	6.2%	-1.4%	2.7%	10.9
1975-1987	4 th plateau	12	-1.7%	1.0%	8.4%	2.2%	19.1
1968-1987	4th cycle	19	0.2%	3.1%	2.5%	2.4%	16
1987-2000	5 th boom	>14 *	7.6%	6.7%	22.1%	19.6%	19.2

Table data sourced from Anderson (2002). * Boom still continues to present of 2004, data since 2000 not included

For most of the period from 1900 to the 1980's the wine industry enjoyed a relatively stable period of growth. The twelve year period between 1975 and 1987 was the only time that the vine acreage actually decreased, but even then the total wine production still increased. Thus, while the first 85 years after Federation exhibit repeated cycles of boom/plateau years, the overall trend is one of growth, consolidation, and continued improvement of both domestic and export markets. This positive trend is largely due to the way the industry strategically positioned itself to respond to the various threats and opportunities that emerged at different stages; these strategic responses will be examined in the next section.

A.2.2 Creation of national industry bodies

The first national wine body to be created was the *Federal Viticultural Council* in 1918, in response to various pressures on the wine industry, but particularly to the internal threat of prohibition from the temperance movement that gained influence during the years of the First World War. In 1929 another national wine industry body was created, the *Australian Wine Overseas Marketing Board*, this time in response to difficulties occurring within the ever-increasing export market. These difficulties occurred to some extent as a result of the artificial manipulation of the industry by government involvement. First, the efforts of the

Australian Government to reward returned soldiers with irrigated vineyards produced significant increases in grape and wine production. Then the Australian Government moved to ensure that there was an export market for the product by reducing export costs via the ‘Wine Export Bounty Act’ of 1924.

A similar effort was made by the British Government to reward the efforts and contribution of countries such as Australia during the First World War by reducing import tariffs into England by 50% for goods imported from British Empire countries (‘The Empire Preference’ of 1925). All of these developments were well-intentioned and resulted in the third of the boom periods identified in Table A-1. However the export boom proved to be unsustainable. Supply exceeded demand in the United Kingdom, and the stockpiled surplus wine went “off”, revealing that the shelf life of the wine was short. As the surplus soured in London warehouses, so too did Australia’s reputation sour as a reliable source of quality wines, particularly for sweet fortified wines. In 1929 the Australian Government responded yet again, enacting the ‘Wine Overseas Marketing Act’, which was administered by the new *Australian Wine Overseas Marketing Board*. This board consisted of government and winery representatives. Their major objective was the centralised regulation and control of all Australian wine exports (Beeston 2001, pp. 154-60; Rankine 2002). The downturn in the fortunes of the export wine industry also coincided with the start of the post-war Depression, which delivered reduced domestic demand as well. Thus the wine industry suffered on multiple fronts and vineyard plantings slowed considerably between 1925 and 1945.

The Australian Wine Overseas Marketing Board became known as the *Australian Wine Board*. One of its first actions was to instigate research into the problem of the ‘question of diseases of sweet fortified wines, in order to cure them and prevent their re-occurrence’ (Rankine 2002). This led to the appointment, in 1934, of a research officer, Mr J. Fornachon, and his eventual solution to the problem, published in 1943, on the ‘Bacterial Spoilage of Fortified Wine’, published by the Australian Wine Board. It also led to the formation of formal wine research by both the Waite Institute and the Council for Scientific and Industrial Research’s section of Oenological Investigations (CSIR became CSIRO in 1949). This group became the Australian Wine Research Institute in 1955. It was registered as a private company, and funded both by the Australian Wine Board and also by funds that had been held in trust from excise charges on previous wine exports.

The Australian Wine Research Institute’s laboratories and pilot winery were officially opened in 1958. Together with the CSIRO Division of Mathematical Statistics and the South Australian State Department of Agriculture, the wine research institute undertook large-scale

scientific studies of the influence of grape varieties, climate and soil on the quality of both the grapes and the wines the grapes produced. These studies were carried out under controlled conditions and triplicated so the results could be statistically evaluated. It was the first large-scale scientific study of its kind in the world, and from this study it was found that the most significant contribution to wine quality came from the grape variety, with climate next and soil type last (Rankine 2002).

Two important observations are made. First, it is reasonable to claim that Australian scientists have made valuable contributions to the Australian and global wine industry by significantly increasing knowledge of the viticultural process and the science of making wine. Second, the Australian wine industry took firm control of its future via the formation of national industry bodies and the introduction of legislation in order to manage the quality and reputation of the product. The current success of the industry owes much to these two consistent themes that have operated since Federation: provision of a regulatory environment to help control the health of the national industry; and progress through scientific research and innovation.

A.3 Growth and globalisation, 1980 - 2003

During the last two decades of the twentieth century the Australian wine industry has markedly increased the volume and value of export sales via various strategies. The increased share of the global market has also favourably enhanced Australia's global and domestic reputation as a source of affordable and high quality wines. The export growth occurred as the result of carefully planned changes and developments by industry bodies and major wine companies; and the years since 1980 have been hailed as the "new era" of Australian wine (WFA & AWBC 2000). In this section some of the strategies and mechanisms used to achieve this growth are examined. The current structure of the industry is reviewed in section A.3.1; the factors contributing to the rapid rise in export growth are examined in section A.3.2; the creation of a global "Australian wine" brand for marketing purposes is examined in section A.3.3; and in section A.3.4 a brief review of the different ways the wine markets can be grouped and classified is presented.

A.3.1 Industry Structure

Several new industry associations were formed during the 1980's and 1990's, giving the wine industry the current structure as shown in Figure A-1. Two key industry bodies act as regulators: the Australian Wine and Brandy Corporation, established in 1980 to administer

all statutory requirements; and the Grape and Wine Research and Development Corporation, established in 1991, to continue research and development for the wine industry.

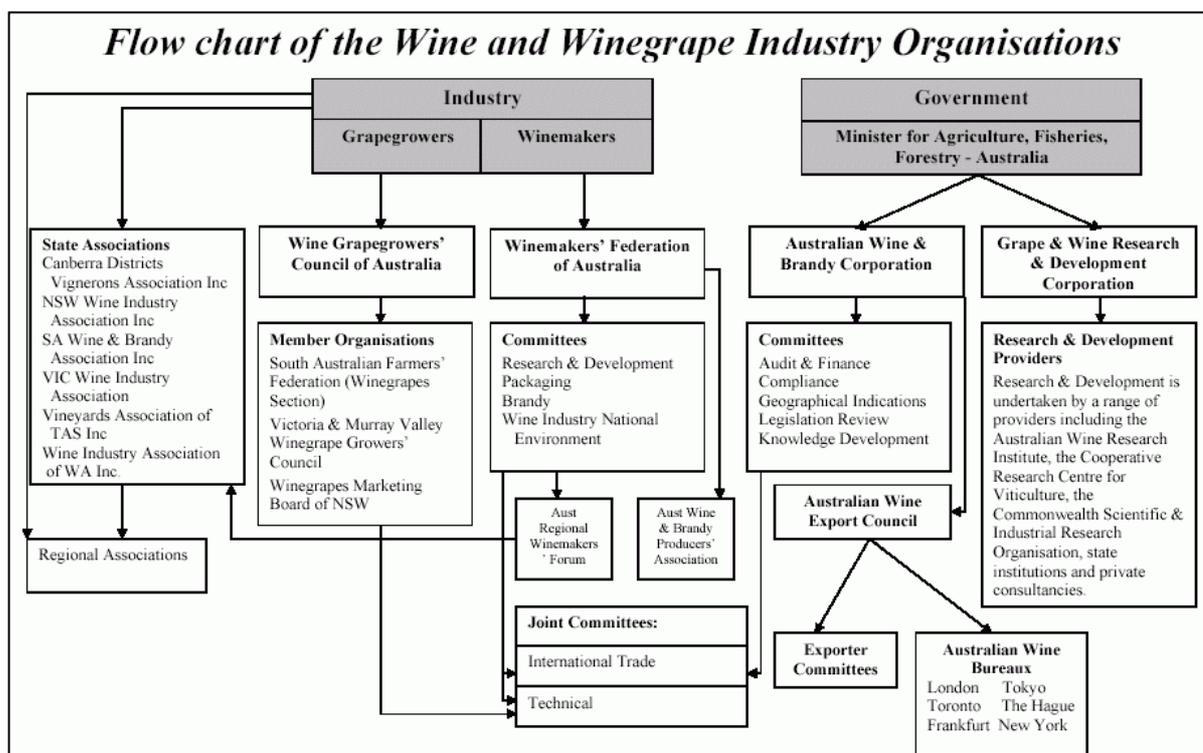


Figure A-1: Wine Industry Structure Diagram (current in 2004)

Source: *Australian Wine and Brandy Corporation* web site, http://www.awbc.com.au/information/industry_structure.asp

As Figure A-1 illustrates, all major stakeholders of the wine industry have a representative body to monitor and look after the interests and well-being of their members and the overall health of the industry – growers; wine-makers; wineries; researchers; and exporters.

The Australian wine industry is dominated by four major wine producers - Southcorp Wines, BRL Hardy, Orlando Wyndham, and Beringer Blass, which together account for 70% of wine production. The remaining 30% of wine comes from approximately 1500 wineries, most of which are micro or small producers. For the ten year period up to 2002 the number of wineries in Australia increased at the average rate of one every five days, while between 1999 and 2002 the average rate of increase rose to one every three days. Most of the new wineries are small, with annual production of less than 100 tonnes (Australian Wine Online 2003).

A.3.2 Factors assisting rapid rise in export growth

The export growth that has been the basis of the Australian wine industry's boom period since 1980 was originally fuelled by the United Kingdom's increasing consumption rate. The

increased prevalence and prominence of Australian wine in bottle shops and supermarkets in the UK helped to raise the profile of Australian wine both in the UK and elsewhere in Europe and other English speaking countries. The start of the large rise in exports has been linked to: the favourable publicity Australian wine received from the UK Masters of Wine after their 1984 visit to research Australian wine; the Australian Wine and Brandy Corporation's subsequent decision to consolidate the gains by appointing a London-based Promotions and Marketing Manager and promoting the marketing concept of "sunshine in a bottle"; and most importantly, the efforts of the large wine companies, formed mainly through mergers and takeovers, with sufficient capacity to develop wine brands for a global market. For example, the Southcorp group, Australia's largest wine producer, is now one of the top ten wine companies in the world by size; controls over twenty major brands including Penfolds, Lindemans, Rosemount and Wynns; and is highly influential in the growth and reputation of Australian wine in key export markets (Australian Wine Online 2003; WFA & AWBC 2000).

The very large wine companies benefit the industry by generating enough economy of scale to support and promote export business. The increasing corporatization, via mergers and alliances, of the big wine companies provides a wide network of contacts, capacity for appointing staff to key global positions, and provides production levels capable of sustainable quality and supply for international markets and brands. Corporate brand creation and promotion is a key aspect of the increase in wine exports (Anderson 2001).

As well as brand promotion by wine companies, another increasingly effective strategy for marketing purposes is to promote wine by regional source, and in particular to use the combination of grape variety and region as a major selling criteria. This is now possible because of the adoption of Geographic Indicators for regions by the wine industry, designed to protect the use of the regional name under international law, limiting its use to describe wines that are produced using at least 85% of grapes grown within that region. As a particular region grows in reputation and status, the marketing benefits of using the region as a selling feature should increase. Research has indicated that regional origin of grapes can and does significantly affect the prices of wine (Schamel & Anderson 2001).

A.3.3 Strategy 2025 marketing the global 'Australia' wine brand

Industry-level planning is a critical feature of the wine industry's success. 'Vision 2025' is a prime example of the thorough and long-term nature of the strategic planning undertaken at a national level. Vision 2025 was launched in 1996 by the Australian wine industry and reads as follows:

The vision is that by the Year 2025 the Australian wine industry will achieve \$4.5 billion in annual sales by being the world's most influential and profitable supplier of branded wines, pioneering wine as a universal first choice lifestyle beverage.

Source: Australian Wine Online website:
http://www.winetitles.com.au/awol/overview/strategy2025/2025_4.asp

The strategy document includes quantified input requirements needed in order to achieve the aim, with the identification of the necessary increase in all aspects of the grape to glass process, ranging from the quantity of acreage of new plantings; processing and storage capability; through to additional labour and funding needs, measured in billions. An earlier industry goal of \$1 billion in annual sales by the year 2000 was achieved ahead of schedule in 1999, and the annual sales in 2002 of \$2 billion (The Australian 2003) means that the 2025 target of just over double this amount looks both realistic and achievable.

Part of the strategy includes provision for generic marketing, particularly by the Australian Wine Export Council, of the wine brand concept "Australia", designed to benefit sales of all Australian wines, and to build on Australia's reputation for "clean and green" produce. The links between Australian wine, tourism, cultural activities and health benefits are also promoted to build a positive image of Australian wine that can be used as a mechanism for achieving the goals laid down in Vision 2025 (WFA & AWBC 2000). Thus the wine industry now uses various levels of regional promotion as part of the package used to educate and inform customers and markets. This cooperative and collaborative approach to gaining industry-wide success is an important mechanism for lowering costs and increasing benefits (Anderson 2001).

A.3.4 Types of markets and their development

The wine industry's own analyses of current wine markets and long-range predictions of wine sales are detailed and multi-faceted. Wine sales may be segmented in various ways. For example, one segmentation option is by wine quality and price. The following categories, with price ranges for the normal 750ml bottle provided, are commonly accepted descriptors: *icon* at \$50+; *ultra-premium* at \$15-\$50; *super premium* at \$10-\$15; *premium* at \$5-\$10; and finally *basic* at under \$5. Current trends in lifestyle changes and wealth patterns indicate that wine consumers are tending to move upwards in the price/quality segments as wine becomes increasingly part of the dining experience; and that this is likely to continue, assuming that

the average wealth of Western and Asian countries continues to increase (WFA & AWBC 2000).

Another way of segmenting the wine sales is by geographic destination, with the initial distinction being made between domestic and international sales. Assuming that the population growth in Australia remains at its current level, future growth in the Australian market is largely tied to converting a reasonable percentage of consumers who now only drink occasionally to become consumers who drink on a regular basis as part of a lifestyle change. Various strategies have been identified by the industry as mechanisms for achieving domestic market growth, all of which rely on increasing the information, promotion and awareness of wine, its health benefits, and links with food and tourism (WFA & AWBC 2000).

Much research on the types and stages of international markets for Australian wine has been undertaken by wine industry bodies under the auspices of the Australian Wine and Brandy Corporation. Using a range of factors to measure the extent and depth of market presence in different countries, Table A-2 displays the market classifications that have been developed.

Table A-2: Classification of export market types

Classification	Description	Countries in this category
Embryonic	Minimal consumer awareness, limited role for agents, few brands, mainly mail order	Thailand, China, Taiwan, Korea
Niche Presence	Limited range of Australian wines, specialist retail outlets, limited media coverage	Germany, Japan, Netherlands, Denmark, Norway, Finland, Malaysia
Volume Penetration	Good range of brands from high volume producers, significant client base recognise Australian wines, outlets may include supermarkets, media provides regular specialist coverage	USA, Canada, Switzerland, Sweden, Hong Kong, Singapore
Category Status	Widespread awareness of Australian wine in client base, diverse range of brands and prices, available in all distribution channels, extensive geographic penetration beyond major cities, media coverage in both specialist and general outlets	New Zealand, Ireland
Category Segmentation	Comprehensive range of brands and prices, represented in all distribution channels, readily available in most outlets, large producers have own staff in the region to support the market	United Kingdom

Source: (WFA & AWBC 2000)

An awareness of the differences between the current states of different international markets as a means of evaluating market potential and marketing challenges is important in the strategy development for all producers seeking expansion in their export markets.

A.4 Speculations on future growth, 2003 onwards

Section A.4.1 examines supply and demand issues facing the wine industry as it moves through the implementation of Vision 2025, and then examines other factors influencing export growth in section A.4.2.

A.4.1 Supply and demand scenarios

Since 1993-94 the area under vine in Australia has more than doubled, going from 67,000 hectares to 159,775 hectares in 2002, an increase of 138%. This dramatic increase in supply requires a matching increase in demand in order for the industry to remain in healthy balance. So far, the status quo between supply and demand is managing to keep relatively stable, despite previous predictions of an over-supply of grapes and unacceptable rises in wine stockpiles. Continued strong growth in export sales has, so far, saved the Australian wine industry from the position of any significant over-supply. Thus, while 2002 stock levels reached record levels, the exports grew a further 24% in the 2001-02 financial year, eclipsing the 19% export growth enjoyed in the previous year (McGrath-Kerr Business Consultants Pty Ltd 2002).

Getting the right balance between supply and demand is clearly critical for the health of any industry. An indicator used by the wine grape growers' industry body in gauging the health of Australian wine production is the ratio of existing stock levels to sales, measured in years. Measurements of stock to sales are taken on the 30th June each year so that reliable comparisons between years can be made. The ratio range identified as being the ideal "comfort zone" is 1.55 – 1.75 years (McGrath-Kerr Business Consultants Pty Ltd 2002, p. 9). This represents an average ratio average for all wine types. Individual ratios have been calculated for the different market sectors. For example, white wine is sold much sooner than red wine, and thus has a smaller stock to sales ratio than does red wine, which is generally cellared for a longer period before being put on the market. In the November 2002 National Winegrape Outlook Conference report, the final average ratio for 2002 is 1.93, above the "comfort zone" but still regarded as being of manageable proportions.

Table A-3, sourced from the November 2002 report, indicates a future projection of a declining stock-to-sales ratio in the medium term, based on projections that rely on export growth of 12% for white wine and 25% growth for red wine for the next three years.

Table A-3: Australian Wine Stock and Sales Disposal Data for 1991 – 2002 and Projections for years 2003-2005

Year	Stock MI	Sales (MI)			Stock-Sales Ratio
		Domestic	Export	Total	
1991	585	301	54	355	1.65
1992	611	315	79	394	1.55
1993	587	312	103	415	1.41
1994	657	320	125	445	1.48
1995	642	313	114	427	1.50
1996	782	309	130	439	1.78
1997	818	334	154	488	1.68
1998	900	339	193	532	1.69
1999	1090	348	216	564	1.93
2000	1191	369	285	654	1.82
2001	1377	384	338	722	1.91
2002	1551	385	419	804	1.93
2003	1706	393	493	886	1.93
2004	1874	395	589	983	1.91
2005	1979	398	687	1085	1.83

Data sourced from Table 9 of The National Winegrape Outlook Conference Report, November 2002 (McGrath-Kerr Business Consultants Pty Ltd 2002).

Figure A-2, based on data in Table A-3, illustrates the exponential nature of the export growth over the last ten years, and includes industry projections for the period 2003-2005.

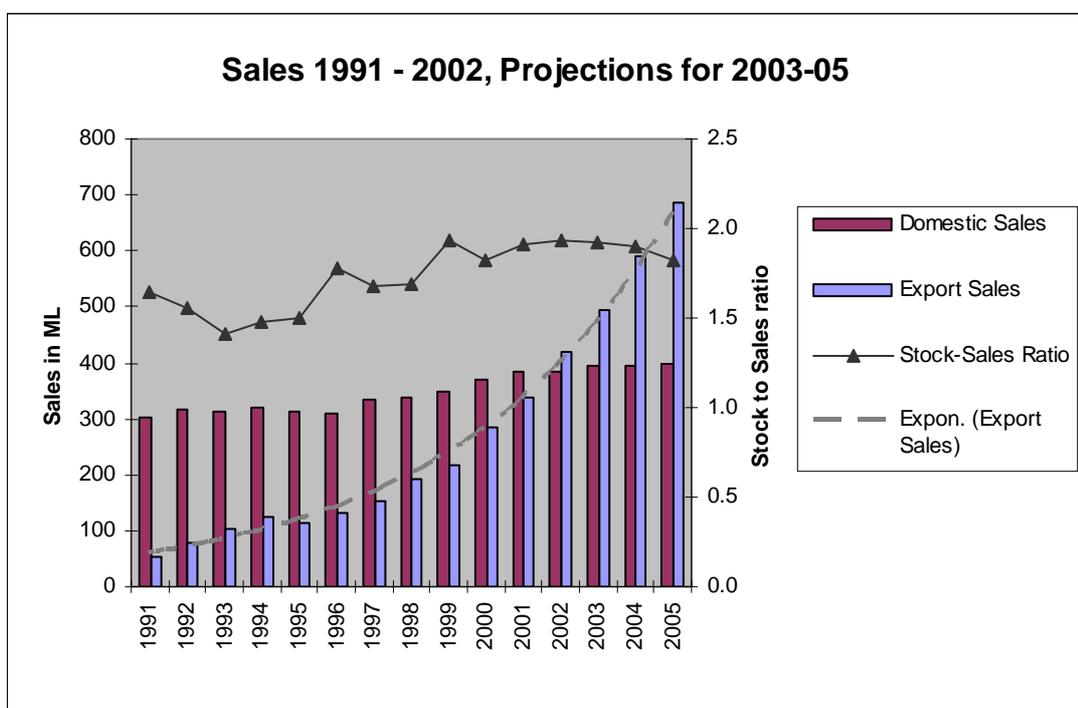


Figure A-2: Domestic and Export Sales from 1991 to 2002, with sales projections for 2003-05, and stock-to-sales ratio

An undersupply of grapes is harmful and constraining to industry growth, while an oversupply of grapes puts pressure on grape prices, and can lead to some grapes not being harvested. Indeed, some grapes from the 2002 crop were not picked, but no quantitative information on the unharvested percentage was available (ACIL 2002). If an oversupply of grapes is combined with a general economic recession, the effects are especially detrimental for the grape growers. For example, the South Australian Government actually subsidised growers to pull out vines in the 1980's when the recession caused demand for wine to fall to such low levels that growers' livelihoods were threatened (Anderson 2002).

The continuing challenge for the Australian wine industry is to maintain growth and profits while continuing to balance grape supply with processing and storage capability, and to maintain a stock-to-sales ratio around the 'comfort zone'. Given that export demand has been the principal driver of most growth in the last decade, and domestic demand for the last few years has remained fairly constant, it is reasonable to speculate that the future health of the industry remains closely tied to a continued growth in exports.

A.4.2 Factors affecting export market growth

Assuming that strong growth in the export market is a requirement for the future of the Australian wine industry, awareness of the different factors affecting export market size is important. Existing research into the export behaviour of Australian wineries suggests that the level of management interest in exports, the ability to network with other wineries and distribution agents, and possession of adequate stock levels are all key factors in export orientation and behaviour (Wickramasekera & Bamberry 2002).

Changes to domestic and global legislation affecting the ease and cost of trade will also be highly relevant (ACIL 2002). For example, changes to taxation rates have the potential to significantly impact future wine sales. Historically wine has often been subject to high levels of taxation, with both import and export taxes commonly applied to internationally traded wine. Australia's major export destinations, as at the end of the 2001-02 period, are the United Kingdom, USA, Canada, New Zealand and Germany (AWBC 2002). If, for example, the European Union's Common Agricultural Policy changes in order to protect the European wine producers against the increasing market share of new world wine imports, then this would be likely to harm Australian exports (Anderson 2001; Anderson, Norman & Wittwer 2001). Also, domestic sales of Australian wine are subject to high levels of consumption tax, with an extra 'wine equalization tax' of 29% applied at the wholesale level before the standard 10% GST is applied at the retail level. The wine taxation level in Australia is one of

the highest in the world. To date, pressure on the Australian Federal Government to have the wine tax reduced has met with no success.

A.5 Role of Internet and concluding remarks

The discussion thus far has briefly reviewed the history and present state of the Australian wine industry. The boom period currently being experienced by the industry is now almost twenty years old, and shows no signs of waning while the export growth fuelling the boom continues to display exponential growth. Research by the industry indicates that there is room for more market growth, and that Australia's increasing supply of quality wines will find a matching demand in international markets.

The current strategies of collaborative marketing, increasing consolidation of wine companies through mergers and alliances to build economy of scale, and marketing of national and regional brands are proving effective as a way of increasing market share abroad. However, one strategy area that remains largely neglected by the industry bodies is that of e-business as a mechanism for increasing market share. Very few references to e-business, e-commerce, and the Internet exist in the strategy documents produced by the various national and state wine industry bodies. For example, the following statement from the WFA and AWBC, in making predictions for the future of Australian wine, represents the extent of acknowledgement of the potential role e-business might have to play in future market growth (WFA & AWBC 2000, p. 6):

Internet and email use has multiplied at an exponential rate in the past four years and this is expected to revolutionise the way business is managed and how wine is sold. In the future producers will be able to interact more directly with consumers and this will have major implications for existing distribution and retail channels.

The statement suggests awareness that e-business has the potential to change how the wine business is carried out in the future, but almost nowhere in the strategy documents produced by the industry bodies is e-business then mentioned. The one major initiative in the introduction of e-business as part of the wine business process is the successful development of the Australian Wine and Brandy Corporation's on-line system for processing Wine Export Approvals. In the 2001-02 financial year, 89% of the almost 78,000 WEA documents were processed online, with greater efficiency and lower costs for exporters (AWBC 2002, p. 31).

The success of the on-line system for wine export approvals indicates that many wine producers have the capability and willingness to use web technologies in improving business process.

To what extent are web technologies and e-business processes being used by wine producers now? Little information is available on this topic. Can the positive example of the online system for WEA's be seen as evidence of the wine producer's readiness to increase their level of e-business use to gain further benefits of increased efficiency and lower transaction costs? The wine industry is heavily dependent on the recording and flow of electronic information. E-business solutions appear to be suitable as a means of passing on product and marketing information around the world, enabling online sales transactions, and providing real-time product ordering and supply information. The major goal of this research is to examine the current nature and extent of how e-business is being used by the wine producers, to investigate the factors that are affecting the adoption behaviour and the reasons that help to explain it.

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Appendix B

Ethics Clearance

2 May 2003

Ms Barbara Roberts
Faculty of Business
USQ

Dear Ms Roberts

Re: Ethics Clearance for Research Project, *An examination of e-business use by the Australian wine industry*

The USQ Human Research Ethics Committee recently reviewed your application for ethics clearance. Your project has been endorsed and full ethics approval is now confirmed. Reference number **H03STU263** has been assigned to this approval.

The Committee is required to monitor research projects that have received ethics clearance to ensure their conduct is not jeopardising the rights and interests of those who agreed to participate. Accordingly, you are asked to forward a **written report** to this office after twelve months from the date of this approval or upon completion of the project.

A questionnaire will be sent to you requesting details that will include: the status of the project; a statement from you as principal investigator, that the project is in compliance with any special conditions stated as a condition of ethical approval; and confirming the security of the data collected and the conditions governing access to the data. The questionnaire, available on the web, can be forwarded with your written report.

Participants in your project should be advised that, if they have a concern regarding the implementation of the project, they should contact The Secretary, Human Research Ethics Committee USQ or telephone (07)4631 2956. Please note that you are responsible for notifying the Committee immediately of any matter that might affect the continued ethical acceptability of the proposed procedure.

Yours sincerely



Christine Bartlett
Postgraduate and Ethics Officer
Office of Research and Higher Degrees

Appendix C

Information and consent form for interview participants

Information and Consent Form for Interview Participants

Study into E-Business use in the Australian wine industry

This interview is designed to gather data to assist in gaining a better understanding of the nature, extent and benefits of e-business use by Australian wine producers.

The term e-business is used in a general sense, and simply refers to Internet-based business processes and activities. For instance, using e-mail and having a web site to display company information are both examples of e-business use.

Information gathered in the interview will be used to gain demographic data on the winery; explore the range of factors that act as either incentives or barriers in the decision to adopt; the range of areas where e-business is utilised in the company's chain of business tasks and activities (eg marketing, communicating with suppliers or customers); and the range of perceived benefits. Also general questions relating to the wine industry will be asked to provide background and context. This information will aid the preparation of a questionnaire that will be sent to all Australian wineries in the next stage of this study. No identifying information on your winery or any staff member from your winery will be made at any stage in this study.

With your permission, audio-taping of the interview to assist with transcription of your responses may occur. No questions of a personal nature will be asked, and no inconvenience or discomfort is expected. You are free to withdraw consent and to discontinue participation in the interview at any time. Please see over for additional information relevant to this study.

In the short term (up to five years), the data collected from this interview will be stored in a locked filing cabinet in the researcher's office, and after five years it will be destroyed.

Consent

I, the participant, have read the information contained in this 'Information & Consent Form', and any questions I have asked have been answered to my satisfaction. I agree to participate in this activity, realising that I may withdraw at any time. I agree that information and research data gathered for the study will be used in the analysis of the use of e-business by Australian wine producers, and will be used in aggregate statistics. No personal identifying data of myself as the participant nor identifying data on the winery will be made.

_____ Date: _____
Participant or Authorised Representative

_____ Date: _____
Investigator

See over for contact details

This research is being conducted by Barbara Roberts, Lecturer, The University of Southern Queensland (USQ), to provide data for analysis as part of a Master of Information Technology (MIT) dissertation through the Faculty of Business at USQ. Any questions relating to this study can be directed to Barbara Roberts on (07) 4631 1283 (W), or (07) 4696 8450 (H). It is anticipated that the full study will be completed by the end of 2003, and access to an online executive summary of the dissertation should be available in January 2004. You will be contacted with information on accessing this site as soon as it is available.

This project has been approved by USQ's Ethics committee for ethics clearance for investigations involving human research. The participants should retain a copy of this consent form.

Your cooperation and generosity in participating in this study is highly valued and appreciated. Confidentiality of all business information provided is assured.

Thank you,

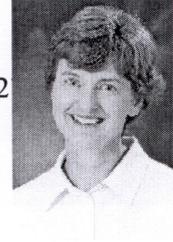
Barbara Roberts

Appendix D

Example cover letter for survey form

22 October 2003

{ MERGEFIELD "Title_CEO" }
{ MERGEFIELD "Chief_Executive_Name_1" } { MERGEFIELD "Chief_Executive_name_2"
{ MERGEFIELD "Winery_Name_2" }
{ MERGEFIELD "Head_Office_Address_1" }
{ MERGEFIELD "Head_Office_Address_2" }
{ MERGEFIELD "Head_Office_TownSuburb" } { MERGEFIELD "Head_Office_State" } {
MERGEFIELD "Head_Office_Postcode" }



Dear { IF { MERGEFIELD Chief_Executive_Name_1 } = "" "Sir/Madam" "" } { MERGEFIELD
"Chief_Executive_Name_1" }

I am conducting a survey on the use of e-business by Australian wine producers in order to find out how e-business is being used, what sort of benefits are being delivered, and why. The survey follows a series of interviews I conducted in July 2003 with representatives from several wineries (ranging from small to very large) about their use of e-business. A number of common factors, acting as drivers or barriers of e-business use, emerged. This survey aims to investigate those factors in more detail, as well as to gather sufficient data to provide an accurate **report on the nature and extent of e-business usage by wineries Australia-wide**. Currently this information has not been collected as part of any research into the Australian wine industry.

Results from this research will provide you with a better understanding of how e-business is being used by different categories of wineries, and also within the industry supply chain. Results should also offer insight into factors that are having the greatest impact on adoption levels, and provide guidance on how to better leverage the Internet. For example, how useful is an extranet site for wineries?

The survey is being sent to all Australian wineries that process more than 20 tonnes annually. Your participation will help ensure that the survey is fully representative and that the findings are valid. Please be assured that your responses will be treated in strict confidence. Each survey is individually numbered only so that non-respondents can be identified for follow-up purposes. Your winery will not be identified in any research publications, and only statistical summaries and correlations of aggregate data will be reported. Ethics clearance from the USQ Ethics Committee has been obtained for this research.

It would be appreciated if the survey is completed by a member of your winery's management who has a good general knowledge of e-business practices within the winery. If you personally do not have time to respond to this survey, will you please pass it on to an appropriate person to complete? The survey has been designed to minimise time demands on participants, and mostly requires a response by ticking the appropriate boxes. The survey should take between 10 and 30 minutes to complete depending on how many sections apply. I would be grateful if the completed survey is returned by the **15th November** in the reply-paid envelope provided. Alternatively the survey can be completed online at <http://www.usq.edu.au/users/robertba/winery/winerysurvey.html>

This research is the major component of my Masters degree in Information Technology. An executive summary of the aggregated survey results will be available online at <http://www.usq.edu.au/users/robertba/winery> by December 2003. Should you have any queries please do not hesitate to contact me on (07) 4631 1283. Thank you for participating in this study.

Barbara Roberts

Enc: Survey Form

Appendix E

Example survey form

E-business – how much, how beneficial and why?

The survey is designed to collect statistics, **opinions and best estimates** of what is going on in wine companies with regard to their e-business activities. For the purpose of this research e-business is defined as all business processes that use the internet, including e-mail, online banking, web sites, and online transactions.

Your contribution is important and highly valued.

The survey is divided into several sections, each related to a particular aspect of e-business. It should take between 10 and 30 minutes to complete. The survey can alternatively be completed online at <http://www.usq.edu.au/users/robertba/winery/winerysurvey.html>

Comments are welcome; there is additional room for comments on the last page.

1 Background winery information

1.1 Which of the following best describes the ownership structure? *Please tick one only*

₁ Privately owned

₂ Public company

₃ Other *please specify* _____

1.2 In what year (*approximately*) was your winery first established?

1.3 Indicate the number of tonnes of grapes crushed in a year by your winery. *Please tick one only*

₁ <50

₆ 1,000 – 2,499

₂ 50-99

₇ 2,500 – 4,999

₃ 100-249

₈ 5,000 – 9,999

₄ 250-499

₉ 10,000 – 19,999

₅ 500-999

₁₀ 20,000 and over

1.4 How many equivalent full time staff does your winery employ (exclude seasonal casuals)? *Please tick one only*

₁ 0-10

₅ 101-250

₂ 11-20

₆ 251-500

₃ 21-50

₇ 501-1000

₄ 51-100

₈ >1000

1.5 In which State/Territory is your winery situated? *Please tick as many as apply if you have multiple wineries*

₁ Victoria

₅ Western Australia

₂ South Australia

₆ Tasmania

₃ New South Wales

₇ Northern Territory

₄ Queensland

₈ ACT

1.6 What percentage of your total annual wine production do you export?

₁ No exports

₂ < 25%

₃ 25-50%

₄ > 50%

1.7 Does your winery have access to the internet?

₁ No – *please go to Section 8*

₂ Yes – *please continue*

on last page

1.8 For how many years (*approximately*) has your winery had access to the internet?

2 Business use of e-mail

2.1 Do staff use e-mail for business purposes?

- ₁ No – please go to Section 3 ₂ Yes – please continue

2.2 Which of the following groups does your winery communicate with using e-mail? Please tick as many as apply

- ₁ Internal staff ₅ Individual customers
₂ Business partners ₆ Business customers (e.g. agents, retailers, distributors)
₃ Suppliers ₇ Marketing/press
₄ Wine industry associations ₈ Govt agencies and departments
₉ Other(s) please specify _____

2.3 Is e-mail increasingly replacing any of the following communication types in your business? Please tick as many as apply

- ₁ Letters ₃ Telephone calls
₂ Faxes ₄ Face to face

2.4 Indicate the change in volume of business e-mail use by the winery over the last 12 months. Please tick one only

- ₁ Decreasing
₂ No change
₃ Slight increase (<25%)
₄ Moderate increase (25-100%)
₅ High increase (> double)

2.5 Estimate the importance of e-mail to your winery's business now.

- ₁ _____ ₂ _____ ₃ _____ ₄ _____ ₅
 Not at all Not very Moderately Very Extremely
 Important

Indicate your level of agreement with each of the following e-mail related statements by ticking the appropriate box	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
2.6 E-mail improves our level of business communication	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
2.7 We prefer to use e-mail because it is now the standard form of communication in business	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
2.8 We have sufficient resources within the company to ensure e-mail is available to all staff who need it	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
2.9 A barrier to increased use of e-mail is the lack of computers in the winery	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
2.10 Our level of e-mail use is driven by what others in our supply chain prefer	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
2.11 We use e-mail to build closer relationships with others in our supply chain	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
2.12 The Government encourages us to communicate with them via e-mail	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
2.13 The easiest way to communicate with Government departments and agencies nowadays is by e-mail	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀

3 Business use of external Web sites

3.1 Does your winery use the Web for any of the following reasons? *Please tick as many as apply*

- ₁ Research for your business
- ₂ Access wine industry sites and information
- ₃ Access Government sites and online services
- ₄ Apply for wine export approvals online
- ₅ Apply for Customs clearance online
- ₆ Investigate suppliers and/or products
- ₇ Investigate distributors/agents/wholesalers
- ₈ Transact online with business partners (eg bottling companies, freight companies)
- ₉ Other(s) please specify _____

3.2 Has the winery purchased a digital certificate to enable secure transactions with organisations such as Customs, or does it plan to do so in the near future?

- ₁ No ₂ Yes ₃ Do not know

3.3 What percentage of the winery's banking transactions now occurs via the Web?

- ₁ None ₂ <25% ₃ 25-50% ₄ >50% ₅ Do not know

3.4 Is your winery using, or planning to use, electronic product catalogue systems such as EANnet to hold your product data for business customers to access?

- ₁ No ₂ Yes ₃ Do not know

3.5 If you answered Yes to the previous question, is the decision to adopt EANnet (or similar) driven by requirements of your major retail customers (eg Coles)?

- ₁ No ₂ Yes ₃ Do not know

<i>Indicate your level of agreement with each of the following statements relating to use of external web sites by ticking the appropriate box</i>	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
3.6 The ability to be able to access industry information online speeds up many aspects of our work	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
3.7 Our use of external Web sites is increasing because of the advantages that the Web delivers	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
3.8 We do not have enough time or opportunity to use the internet and other Web sites as much as we would like	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
3.9 The degree to which we are able to use other Web sites is not affected by our level of internal resources	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
3.10 Our use of external Web sites is influenced by what others in our supply chain have placed on their Web sites	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
3.11 Trading partners and industry groups now offer so much useful online information and transaction processing capability that we are opting to use their Web sites more and more	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
3.12 The Australian Government is forcing increased use of e-business by mandating use of online options for export declarations by Dec 1 st 2003	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
3.13 Compliance with Government regulations is easier now that necessary and relevant information can be located on the various Government Web sites	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀

5 Web site for business access only (extranet)...continued

5.5 Have the overall benefits of the extranet lived up to management expectations?

₁ _____ ₂ _____ ₃ _____ ₄ _____ ₅ _____
 No, much lower Lower than expected Yes, met expectations Better than expected Much better

Indicate your level of agreement with each of the following extranet related statements by ticking the appropriate box	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
5.6 The ease of providing business information to others is significantly improved by having our own extranet site	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
5.7 We have reduced our costs of supplying product information to others by publishing the information on our extranet site	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
5.8 We are limited by our internal resources and capacity in what we can do on our extranet	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
5.9 The winery's capacity to provide information on the extranet is influenced by the Web compatibility of our existing computer systems	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
5.10 We added the extranet to make it easier for others to do business with us	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
5.11 The need to provide data to supply chain partners was a driver in deciding to build the extranet	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
5.12 We plan to increase the exchange of electronic information with business partners via our extranet so that it is easier to track our winery data for compliance purposes with Government regulations.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
5.13 Electronic exchange of information through our extranet is partly driven by increasing provision of online services by Australian Government departments	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀

6 Internal Web site for winery staff (intranet)

6.1 Does your winery have a Web site that only your staff can access (i.e. an intranet)?

₁ No – please go to Section 7 ₂ Yes – please continue

6.2 What are the major purposes of the intranet? Please tick as many as apply

- ₁ Provides a distribution point for up-to-date policies, procedures and forms
- ₂ Provides business reports and/or company news to staff
- ₃ Allows staff to update their own personal contact details
- ₄ Other(s) please specify _____

6.3 Rate the intranet's importance as part of the winery's business strategy.

₁ _____ ₂ _____ ₃ _____ ₄ _____ ₅ _____
 Not at all Not very Moderately Very Extremely
 Important

6.4 Have the overall benefits of the intranet lived up to management expectations?

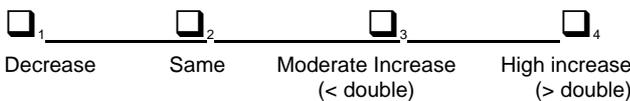
₁ _____ ₂ _____ ₃ _____ ₄ _____ ₅ _____
 No, much lower Lower than expected Yes, met expectations Better than expected Much better

6 Internal Web site for winery staff (intranet)...continued

Indicate your level of agreement with each of the following intranet related statements by ticking the appropriate box	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
6.5 The intranet improves awareness of the company vision through better information sharing	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
6.6 It is beneficial to have internal policies, procedures and forms available on the intranet at all times to all staff (regardless of their location)	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
6.7 Before we can add more functionality to the intranet we need additional resources	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
6.8 The impact of the intranet within the company is reduced by the lack of computer skills of some of our employees	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
6.9 A motivation for having the intranet site was to ensure our staff could provide a better service to our suppliers and customers	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
6.10 The content of the intranet is influenced by the activities and needs of other companies in our supply chain	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
6.11 One reason we added the intranet was to ensure compliance with Government regulations by making sure staff use up-to-date forms	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
6.12 We use the intranet to provide quick links to useful Government sites (eg AWBC)	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀

7 General feedback on your winery's use of e-business

7.1 Considering all areas of e-business usage by your winery, estimate the change over the last 2 years. *Please tick one only*



Indicate your level of agreement with each of the following general e-business statements by ticking the appropriate box	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
7.2 Benefits gained from internet/Web use for business are significant	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
7.3 Using the internet/Web instead of other forms of communication has not delivered us any real advantages yet	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
7.4 Our decisions on how we use e-business are strongly influenced by the available computing resources within the business	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
7.5 We do not have sufficient expertise and skills to do more with e-business	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
7.6 We cannot make decisions on how to use e-business in isolation – it depends on what others in the industry do	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
7.7 We are not big enough to lead the way with e-business, so we only adopt it when other groups in our supply chain make it worthwhile	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
7.8 By providing the option to complete Wine Export Approvals online, the Australian Government is encouraging increased use of e-business by wineries	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀
7.9 Soon most wineries will have to use some e-business simply because the Australian Government will force them to do so by its power to mandate how compliance will occur	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₀

Appendix F

Survey form with response numbers

E-business – how much, how beneficial and why?

The survey is designed to collect statistics, **opinions and best estimates** of what is going on in wine companies with regard to their e-business activities. For the purpose of this research e-business is defined as all business processes that use the internet, including e-mail, online banking, web sites, and online transactions.

Your contribution is important and highly valued.

The survey is divided into several sections, each related to a particular aspect of e-business. It should take between 10 and 30 minutes to complete. The survey can alternatively be completed online at <http://www.usq.edu.au/users/robertba/winery/winerysurvey.html>

Comments are welcome; there is additional room for comments on the last page.

1 Background winery information (198 usable responses from 1065 sent)

1.1 Which of the following best describes the ownership structure? *Please tick one only*

- 185 Privately owned
 10 Public company
 2 Other: 1 – private investor group, 1 – owned by O/S company

1.2 In what year (*approximately*) was your winery first established?

Range from 1842 to 2003 _____

1.3 Indicate the number of tonnes of grapes crushed in a year by your winery. *Please tick one only*

- | | |
|-------------------------------------|--|
| <input type="checkbox"/> 50 <50 | <input type="checkbox"/> 13 1,000 – 2,499 |
| <input type="checkbox"/> 39 50-99 | <input type="checkbox"/> 11 2,500 – 4,999 |
| <input type="checkbox"/> 31 100-249 | <input type="checkbox"/> 7 5,000 – 9,999 |
| <input type="checkbox"/> 17 250-499 | <input type="checkbox"/> 5 10,000 – 19,999 |
| <input type="checkbox"/> 18 500-999 | <input type="checkbox"/> 7 20,000 and over |

1.4 How many equivalent full time staff does your winery employ (exclude seasonal casuals)? *Please tick one only*

- | | |
|-----------------------------------|-------------------------------------|
| <input type="checkbox"/> 142 0-10 | <input type="checkbox"/> 4 101-250 |
| <input type="checkbox"/> 21 11-20 | <input type="checkbox"/> 0 251-500 |
| <input type="checkbox"/> 22 21-50 | <input type="checkbox"/> 1 501-1000 |
| <input type="checkbox"/> 5 51-100 | <input type="checkbox"/> 1 >1000 |

1.5 In which State/Territory is your winery situated? *Please tick as many as apply if you have multiple wineries*

- | | |
|---|---|
| <input type="checkbox"/> 47 Victoria | <input type="checkbox"/> 30 Western Australia |
| <input type="checkbox"/> 65 South Australia | <input type="checkbox"/> 6 Tasmania |
| <input type="checkbox"/> 44 New South Wales | <input type="checkbox"/> 0 Northern Territory |
| <input type="checkbox"/> 9 Queensland | <input type="checkbox"/> 0 ACT |

1.6 What percentage of your total annual wine production do you export?

- 51 No exports 71 < 25% 44 25-50% 31 > 50%

1.7 Does your winery have access to the internet?

- 3 No – *please go to Section 8 on last page* 195 Yes – *please continue*

1.8 For how many years (*approximately*) has your winery had access to the internet?

Range from ½ year to 15 years _____

2 Business use of e-mail

2.1 Do staff use e-mail for business purposes?

3 No – please go to Section 3 192 Yes – please continue

2.2 Which of the following groups does your winery communicate with using e-mail? Please tick as many as apply

99 Internal staff 166 Individual customers
 120 Business partners 167 Business customers (e.g. agents, retailers, distributors)
 166 Suppliers 143 Marketing/press
 168 Wine industry associations 145 Govt agencies and departments
 0 Other(s) please specify _____

2.3 Is e-mail increasingly replacing any of the following communication types in your business? Please tick as many as apply

161 Letters 124 Telephone calls
 171 Faxes 60 Face to face

2.4 Indicate the change in volume of business e-mail use by the winery over the last 12 months. Please tick one only

1 Decreasing
 17 No change
 61 Slight increase (<25%)
 83 Moderate increase (25-100%)
 27 High increase (> double)

2.5 Estimate the importance of e-mail to your winery's business now.

0 14 49 81 47
Not at all Not very Moderately Very Extremely
 Important

Indicate your level of agreement with each of the following e-mail related statements by ticking the appropriate box	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
2.6 E-mail improves our level of business communication	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 16	<input type="checkbox"/> 85	<input type="checkbox"/> 84	<input type="checkbox"/> 0
2.7 We prefer to use e-mail because it is now the standard form of communication in business	<input type="checkbox"/> 2	<input type="checkbox"/> 14	<input type="checkbox"/> 41	<input type="checkbox"/> 87	<input type="checkbox"/> 47	<input type="checkbox"/> 1
2.8 We have sufficient resources within the company to ensure e-mail is available to all staff who need it	<input type="checkbox"/> 2	<input type="checkbox"/> 20	<input type="checkbox"/> 22	<input type="checkbox"/> 86	<input type="checkbox"/> 62	<input type="checkbox"/> 0
2.9 A barrier to increased use of e-mail is the lack of computers in the winery	<input type="checkbox"/> 37	<input type="checkbox"/> 81	<input type="checkbox"/> 27	<input type="checkbox"/> 36	<input type="checkbox"/> 6	<input type="checkbox"/> 2
2.10 Our level of e-mail use is driven by what others in our supply chain prefer	<input type="checkbox"/> 5	<input type="checkbox"/> 33	<input type="checkbox"/> 55	<input type="checkbox"/> 85	<input type="checkbox"/> 13	<input type="checkbox"/> 1
2.11 We use e-mail to build closer relationships with others in our supply chain	<input type="checkbox"/> 6	<input type="checkbox"/> 23	<input type="checkbox"/> 61	<input type="checkbox"/> 83	<input type="checkbox"/> 15	<input type="checkbox"/> 3
2.12 The Government encourages us to communicate with them via e-mail	<input type="checkbox"/> 3	<input type="checkbox"/> 19	<input type="checkbox"/> 65	<input type="checkbox"/> 77	<input type="checkbox"/> 18	<input type="checkbox"/> 9
2.13 The easiest way to communicate with Government departments and agencies nowadays is by e-mail	<input type="checkbox"/> 7	<input type="checkbox"/> 25	<input type="checkbox"/> 71	<input type="checkbox"/> 63	<input type="checkbox"/> 15	<input type="checkbox"/> 11

3 Business use of external Web sites

3.1 Does your winery use the Web for any of the following reasons? *Please tick as many as apply*

- 153 Research for your business
- 172 Access wine industry sites and information
- 155 Access Government sites and online services
- 76 Apply for wine export approvals online
- 31 Apply for Customs clearance online
- 142 Investigate suppliers and/or products
- 98 Investigate distributors/agents/wholesalers
- 101 Transact online with business partners (eg bottling companies, freight companies)
- 12 Other(s) 4 banking, 1 travel bookings, 1 buy artwork & machinery, 3 wine sales, 1 customs online compliance, 1 use thesaurus site, 1 site of o/s partner

3.2 Has the winery purchased a digital certificate to enable secure transactions with organisations such as Customs, or does it plan to do so in the near future?

- 131 No
- 22 Yes
- 39 Do not know

3.3 What percentage of the winery's banking transactions now occurs via the Web?

- 31 None
- 53 <25%
- 35 25-50%
- 69 >50%
- 5 Do not know

3.4 Is your winery using, or planning to use, electronic product catalogue systems such as EANnet to hold your product data for business customers to access?

- 108 No
- 39 Yes
- 47 Do not know

3.5 If you answered Yes to the previous question, is the decision to adopt EANnet (or similar) driven by requirements of your major retail customers (eg Coles)?

- 12 No
- 24 Yes
- 5 Do not know

<i>Indicate your level of agreement with each of the following statements relating to use of external web sites by ticking the appropriate box</i>	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
3.6 The ability to be able to access industry information online speeds up many aspects of our work	<input type="checkbox"/> 4	<input type="checkbox"/> 9	<input type="checkbox"/> 28	<input type="checkbox"/> 116	<input type="checkbox"/> 35	<input type="checkbox"/> 1
3.7 Our use of external Web sites is increasing because of the advantages that the Web delivers	<input type="checkbox"/> 3	<input type="checkbox"/> 16	<input type="checkbox"/> 31	<input type="checkbox"/> 106	<input type="checkbox"/> 36	<input type="checkbox"/> 0
3.8 We do not have enough time or opportunity to use the internet and other Web sites as much as we would like	<input type="checkbox"/> 10	<input type="checkbox"/> 53	<input type="checkbox"/> 45	<input type="checkbox"/> 71	<input type="checkbox"/> 13	<input type="checkbox"/> 0
3.9 The degree to which we are able to use other Web sites is not affected by our level of internal resources	<input type="checkbox"/> 5	<input type="checkbox"/> 28	<input type="checkbox"/> 41	<input type="checkbox"/> 94	<input type="checkbox"/> 18	<input type="checkbox"/> 3
3.10 Our use of external Web sites is influenced by what others in our supply chain have placed on their Web sites	<input type="checkbox"/> 6	<input type="checkbox"/> 17	<input type="checkbox"/> 86	<input type="checkbox"/> 72	<input type="checkbox"/> 8	<input type="checkbox"/> 2
3.11 Trading partners and industry groups now offer so much useful online information and transaction processing capability that we are opting to use their Web sites more and more	<input type="checkbox"/> 5	<input type="checkbox"/> 22	<input type="checkbox"/> 59	<input type="checkbox"/> 90	<input type="checkbox"/> 14	<input type="checkbox"/> 2
3.12 The Australian Government is forcing increased use of e-business by mandating use of online options for export declarations by Dec 1 st 2003	<input type="checkbox"/> 2	<input type="checkbox"/> 7	<input type="checkbox"/> 76	<input type="checkbox"/> 60	<input type="checkbox"/> 6	<input type="checkbox"/> 41
3.13 Compliance with Government regulations is easier now that necessary and relevant information can be located on the various Government Web sites	<input type="checkbox"/> 9	<input type="checkbox"/> 9	<input type="checkbox"/> 43	<input type="checkbox"/> 110	<input type="checkbox"/> 9	<input type="checkbox"/> 13

4 Public Web site – business to customer

4.1 Does your winery have a public Web site?

40 No – please go to Section 5 155 Yes – please continue

4.2 What motivated your winery to create a public Web site? Please tick as many as apply

143 Provide general winery information
 84 Need to have one as it is now expected
 104 Provide tourist information to increase cellar door sales
 43 Reduce marketing costs
 135 Promote brands and winery image
 70 Supply information on how to buy wine from existing retailers and distributors
 89 Provide a sales channel with online ordering facilities
 0 Other(s) _____

4.3 For how many years has your winery had a public web site?

27 Less than 1 year 61 1-3 years 67 More than 3 years

4.4 If your winery provides the option to buy your wine online, what is the pricing strategy? Please tick one only

51 No option to buy wine online – please go to 4.6
 17 Discount price
 70 Full retail price
 13 Other 9 use cellar door prices, 3 use club membership prices, 1 uses a combination of discount and full prices

4.5 If your winery provides the option to buy online, have online sales met management expectations?

29 _____ 48 _____ 17 _____ 3 _____ 2 _____
 No, much Lower than Yes, met Better than Much
 lower expected expectations expected better

4.6 If your winery does not provide the option to buy your wine online, what is the major reason? Please tick one only

25 The option of providing online sales does not currently have a high enough priority in the business strategy
 14 There is no plan to add online sales as we need to avoid conflict with existing business customers
 6 There is no plan to add online sales as there is not enough demonstrated benefit for the winery
 10 Other: 2 – planning to add, 3 - security concerns, 2 – unsuitable, 1 – not applicable as a contract winery,
 1 – costs too high, 1 – lack time,

4.7 In your public web site, which of the following are included? Please tick as many as apply

63 Links to other wineries or tourism destinations
 148 Product information
 82 Contact details of major distributors and retailers
 93 On-line ordering
 53 On-line payment options
 72 Off-line payment options
 41 Security policy
 47 Privacy policy
 73 Option to register online to join a wine club

4.8 Rate your public web site's importance as part of your winery's business strategy.

4 _____ 30 _____ 77 _____ 32 _____ 9 _____
 Not at all Not very Moderately Very Extremely
 Important

4 Public Web site – business to customer...continued

4.9 Have the overall benefits of your public web site lived up to management expectations?



Indicate your level of agreement with each of the following statements related to your public web site by ticking the appropriate box	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
4.10 Our public Web site is our most effective method we have had of presenting our business face to the world	18	52	36	39	8	0
4.11 We would not like to be without our public Web site now as it delivers many marketing benefits	3	16	43	75	16	0
4.12 We could do more with our public Web site if we had more resources	2	19	27	69	35	0
4.13 Due to the use of outsourcing options, what we do on our Web site is not restricted by internal expertise and skill levels	8	33	33	65	6	6
4.14 The strategic role of our public Web site is restricted by the potential reactions of our existing customers	4	34	69	29	5	10
4.15 We consider the reactions of our distribution chain when deciding on the functionality of our Web site	42	31	44	59	5	8
4.16 Some of the content on the Web site is included to demonstrate compliance with regulations	3	43	56	33	2	13
4.17 The Australian Government's push to increase e-business use by Australian companies has no influence on the content of our public Web site	2	8	35	91	11	6

5 Web site for business access only (extranet)

5.1 Does your winery have a restricted access web site for business partners and/or media press (i.e. an extranet)?



5.2 Who uses the extranet? Please tick as many as apply

- Business partners
- Own employees
- Retailers
- Suppliers
- Press group
- Distributors and agents
- Other(s): Advertising agencies

5.3 What is available on the extranet? Please tick as many as apply

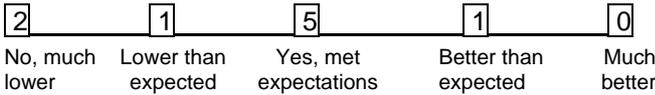
- Image files
- Product specifications
- Tasting notes
- Company information
- Online ordering
- Order status
- Other(s): Vintage reports & winemaker profiles

5.4 Rate the extranet's importance as part of the winery's business strategy.



5 Web site for business access only (extranet)...continued

5.5 Have the overall benefits of the extranet lived up to management expectations?



Indicate your level of agreement with each of the following extranet related statements by ticking the appropriate box	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
5.6 The ease of providing business information to others is significantly improved by having our own extranet site	1	1	0	4	3	0
5.7 We have reduced our costs of supplying product information to others by publishing the information on our extranet site	1	1	1	3	3	0
5.8 We are limited by our internal resources and capacity in what we can do on our extranet	0	4	0	3	2	0
5.9 The winery's capacity to provide information on the extranet is influenced by the Web compatibility of our existing computer systems	0	6	0	2	0	1
5.10 We added the extranet to make it easier for others to do business with us	0	0	0	7	2	0
5.11 The need to provide data to supply chain partners was a driver in deciding to build the extranet	0	1	1	6	1	0
5.12 We plan to increase the exchange of electronic information with business partners via our extranet so that it is easier to track our winery data for compliance purposes with Government regulations.	1	4	1	1	1	1
5.13 Electronic exchange of information through our extranet is partly driven by increasing provision of online services by Australian Government departments	1	6	2	0	0	0

6 Internal Web site for winery staff (intranet)

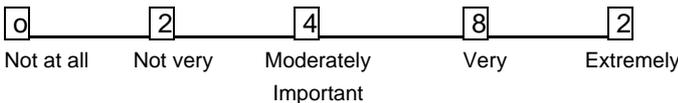
6.1 Does your winery have a Web site that only your staff can access (i.e. an intranet)?



6.2 What are the major purposes of the intranet? Please tick as many as apply

- 14 Provides a distribution point for up-to-date policies, procedures and forms
- 12 Provides business reports and/or company news to staff
- 5 Allows staff to update their own personal contact details
- 4 Other(s): 1 – back up data, 1 – access product info, 1 – support workgroups, 1 – update information

6.3 Rate the intranet's importance as part of the winery's business strategy.



6.4 Have the overall benefits of the intranet lived up to management expectations?



6 Internal Web site for winery staff (intranet)...continued

Indicate your level of agreement with each of the following intranet related statements by ticking the appropriate box	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
6.5 The intranet improves awareness of the company vision through better information sharing	0	2	3	8	1	1
6.6 It is beneficial to have internal policies, procedures and forms available on the intranet at all times to all staff (regardless of their location)	0	0	2	9	4	0
6.7 Before we can add more functionality to the intranet we need additional resources	1	3	2	5	3	1
6.8 The impact of the intranet within the company is reduced by the lack of computer skills of some of our employees	1	4	3	6	1	0
6.9 A motivation for having the intranet site was to ensure our staff could provide a better service to our suppliers and customers	0	1	5	9	0	0
6.10 The content of the intranet is influenced by the activities and needs of other companies in our supply chain	0	5	5	4	0	1
6.11 One reason we added the intranet was to ensure compliance with Government regulations by making sure staff use up-to-date forms	0	7	6	1	0	1
6.12 We use the intranet to provide quick links to useful Government sites (eg AWBC)	2	2	3	8	0	0

7 General feedback on your winery's use of e-business

7.1 Considering all areas of e-business usage by your winery, estimate the change over the last 2 years. *Please tick one only*

1 27 117 40
 Decrease Same Moderate Increase (< double) High increase (> double)

Indicate your level of agreement with each of the following general e-business statements by ticking the appropriate box	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not know
7.2 Benefits gained from internet/Web use for business are significant	5	13	48	96	31	0
7.3 Using the internet/Web instead of other forms of communication has not delivered us any real advantages yet	15	98	34	36	9	1
7.4 Our decisions on how we use e-business are strongly influenced by the available computing resources within the business	9	60	41	71	10	1
7.5 We do not have sufficient expertise and skills to do more with e-business	15	75	42	50	11	0
7.6 We cannot make decisions on how to use e-business in isolation – it depends on what others in the industry do	10	78	47	53	2	2
7.7 We are not big enough to lead the way with e-business, so we only adopt it when other groups in our supply chain make it worthwhile	12	59	35	75	8	2
7.8 By providing the option to complete Wine Export Approvals online, the Australian Government is encouraging increased use of e-business by wineries	4	2	32	111	19	25
7.9 Soon most wineries will have to use some e-business simply because the Australian Government will force them to do so by its power to mandate how compliance will occur	3	8	51	88	16	27

Appendix G

Comments from survey respondents

Appendix G - Comments from respondents

Comments were received from just over a quarter of the respondents (52 of 198). The full list of comments is presented in Table G-1. The comments are listed in order by the winery size, and within each winery size by the order of the actual tonnage range.

Table G-1 Comments from respondents, sorted in increasing order of winery size

Comment Number	Winery Size	Comments
1	Small, 20-49	Following limits to use 1. Unreliable phone, electricity; 2. No hardware support; 3. no broadband; 4. unreliable hardware & software
2	Small, 20-49	Internet/email connections speeds are a major impediment to efficient utilization in our area. This is consolidated by the proliferation of spam and unsolicited sales/promotion emails sent by copious numbers of businesses who think they have something to offer us. In many cases such businesses fail to format their text to tell you who they area and what they offer (even those that are actually useful contacts seem unable to communicate their message effectively, and take apparent delight in sending large attachment docs which slow our email downloads to a near halt.) However email is a useful form of communication with customers (especially those who are remote from us) even just as a first contact prior to their visit to our area or as a request for info. For similar reasons we are developing a website with initially more emphasis on providing info and a contact point for those searching the web etc than for a sales point. Links to other tourist businesses etc in our area will be important.
3	Small, 20-49	good reason to use e-mail is that it can be used after hours
4	Small, 20-49	Virtually all our retail sales are done by e-business (~60% of our production) and we are considered leaders in this aspect in Australia.
5	Small, 20-49	E-business time consuming, for very little increase in sales. Small companies cannot afford to employ someone just to look after this side of the business. However, after having a web-site for 18 months, it is having a small effect on promoting our brand
6	Small, 20-49	I believe training is the biggest need in small businesses for internet use. Quick access to the net would then be most attractive.
7	Small, 20-49	Being in the country on an "old" telecom system, we are being hampered by Telstra - major obstacles to broadband or continual use internet

8	Small, 20-49	For a small business there are significant time constraints on using internet services. We had a sophisticated web site for marketing our wines but it was recently abandoned due to lack of use.
9	Small, 20-49	Time to learn and slow download capability are the most influential
10	Small, 20-49	Very basic e-business, I intend to adopt a secure website for sales and promotion in the near future. We will develop e-business slowly, but communication to our staff by e-mail in our small vineyard is not cost effective – the areas of interaction of our organisation electronically is definitely positive but still not a great part of our business. A lot of information flows in by e-mail. I use internet banking as much as possible for accounts received/payments as a cheap and efficient option.
11	Small, 20-49	Technology too unreliable, costly to maintain, slow and inconvenient. Do expect some value from tourism related use. Note that one survey found that 6% of sales attributed to internet communication.
12	Small, 20-49	I find searching websites boring and time consuming
13	Small, 20-49	We currently use website extensively for accommodation and are just starting to set up for our wine business
14	Small, 50-99	Wine export approvals online - limit is must go to Adelaide to be trained before you can use it - very dumb as isolated areas need it more
15	Small, 50-99	Almost impossible to operate without email now and web pages becoming more relevant. Most young people only know this way of business. As older people retire I don't think there will be a business that doesn't use these facilities
16	Small, 50-99	Web sites of trading partners - variable, strongly agree some are useful, disagree for others
17	Small, 50-99	Our small business is a very basic user of web services at present - however as we grow we expect to increase overall our usage of the web, mainly used now for banking and communication.
18	Small, 50-99	Network access speeds are limited
19	Small, 50-99	Most important limitations are costs related to e-business and available network speeds
20	Small, 50-99	I am only recently coming to grips with e-business and haven't a lot of confidence in either my own ability or trust in the internet. However I appreciate its growing importance and certainly believe it is absolutely essential for the future
21	Small, 50-99	Emphasis on limitation of network access speeds as barrier

22	Small, 50-99	75% emails are junk, speed is major limiting factor, anti-virus protection takes 20-50 minutes to download daily. E-mail attachments are often huge and irrelevant. Need better lines to replace 8km of ancient copper wire.
23	Small, 50-99	Barrier - Ignorance and lack of time to use it
24	Small, 50-99	Logging onto internet fairly time consuming. Often prefer an instant fax for communication. Security is concern. We don't use internet banking.
25	Small, 50-99	I believe that wine sales via net are very limited, particularly for small boutique wine producers. Sales are poor. That said, our website is a wonderful medium to allow immediate "brochures" to clients and prospects.
26	Small, 50-99	Small family business, not really too computer savvy!
27	Small, 50-99	Spam is rapidly undermining the future of the email function
28	Small, 50-99	Small, getting bigger due success in selling to restaurants, have built website, building own cellar door/restaurant - lots going on, made mess of e-commerce - no sales at all. We don't have strategy, or know what to do. Need a plan. Supplier use extensive
29	Small, 50-99	Emphasised limitation of access speed
30	Small, 100-249	It is difficult when we are a small family owned business; the one computer is used for all sales, email, web, wages etc. We don't have the space for another one at this stage. Need people that are computer competent. I have found people like to sit at it all day (time wasting) instead of concentrating on sales, orders etc.
31	Small, 100-249	Lack time to learn, have a permanent connection to e-mail, used daily for business communication and paying bills. We find sourcing information very slow and time consuming
32	Small, 100-249	Many retail customers are not internet or email savvy enough to use this medium to its full extent. We go forward but they make us face reality.
33	Small, 100-249	Some of our business partners, i.e. distributors, overseas agents etc, suffer from internet overload, i.e. too many e-mails coming in. If we want special attention, we send a fax or a personal letter.
34	Small, 100-249	Illiterate myself - will wait for next generation
35	Small, 100-249	Has many limitations, good to order supplies etc. Cellar door sales need customers shipping/buying wine - can't do this electronically
36	Small, 100-249	We do not wish to have our pricing on the net to the detriment of our wholesalers - we are cheaper than they are

37	Medium, 250-499	E-business is the way to go, but just one of the ways of maintaining effective communication with business partners. Biggest advantage - reduced time taken to answer common queries - they can do all that themselves when they want
38	Medium, 250-499	Implementation issues act as a barrier – eg disruption, training and cost of training
39	Medium, 250-499	Being in the country we don't have access to broadband internet (other than satellite). Telstra have not agreed to any broadband access in the near future. This is placing a barrier to increased internet use both for email, sales, marketing etc
40	Medium, 250-499	Emphasised limitation access speed
41	Medium, 250-499	Sorry, the government implementation required for its tax system is stifling our internet resources for progression of growth in marketing
42	Medium, 500-999	Web site only up for 2 weeks - too early to say how important and beneficial it is
43	Large, 1000-2499	Our EMS program will be internet based using Oxygen - looks very good and maybe able to include our OARS and WACCP programme as well.
44	Large, 1000-2499	Some internal problems convincing senior management & accounts dept of benefits of using e-business - mainly due to inability to show ROI. We are too small for many programs, while off-shelf programs don't meet our needs. Develop own s/w now.
45	Large, 1000-2499	Most wineries are located in rural areas where line speeds and telecommunication systems and service are sub-standard. This provides the greatest hindrance to our capabilities.
46	Large, 2500-4999	Working on extranet...
47	Large, 2500-4999	E-business has far too much unsolicited junk mail on it. The more it is used the more time it takes to pick out the relevant material.
48	Large, 5000-9999	Don't sell online because most of our business is export and online purchases are too complicated due to varying laws. Email, the internet and e-business are all very useful tools, but increasingly we're making sure that we don't forget to telephone or meet face to face with people as it can become very impersonal doing everything online. In this industry, we feel that personal relationships are very important, so endeavour not to let the ease of internet use jeopardise these relationships.
49	Large, 5000-9999	It will continue to become more important for our business
50	Large, 5000-9999	Our business is growing rapidly - hard to identify exact requirements and resource depth in our IT dept, not to mention costs in the shorter term

51	Very Large, 10000- 19999	Software costs – who cares as long as there is ROI? Our internal data integrity is very good but we are putting processes in place to make it excellent – this will be a barrier to most once they look under the covers! Security concerns exist but are manageable. The other barrier is the relative priority of business activities.
52	Very Large, 20000 +	<p><i>Comments within survey:</i> 1) Export approvals and Customs are work in progress for online adoption at present; 2) other user of extranet – advertising agencies; 3) other info available on extranet: vintage reports, winemaker profiles, food matching, some downloadable in store advertising material; 4) other use of intranet – facilitations of workgroups.</p> <p><i>Major comment at end of survey:</i> There is still an emphasis on old world (EDI) communication with major trading partners in the global market place. Take up of XML and internet protocols within business dramatically lags the government's vision of the world. The absence of clear cut business value models inhibits take up from an internal perspective - this is the single most significant inhibitor. The stronger the IT management of cost, the less spend on the e-Business sector - seems contradictory, but much of the development work and requests in these areas are seen as soft benefits rather than hard, or viewed as purely marketing. Measurement of returns in that space is therefore correspondingly difficult.</p> <p>Good luck with the project.</p>