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The Search for Advantage: Levels of E-Business Adoption by Different Firms

Summary

E-business – the practice of carrying out business activities electronically using network or telecommunication technologies – has had a profound influence on the manner in which companies conduct business in the past 15 years. As a result, it is important to develop an understanding of the firm characteristics that lead to higher rates of e-business adoption. The authors used a survey designed to determine different rates of e-business adoption for a range of company characteristics, including service vs. manufacturing and company type, size and revenue, as well as job title and gender, and conducted it with a cross-section of Australian senior professionals and business owners. The results indicate that service firms exhibit a higher rate of e-business adoption than manufacturers, while certain service businesses such as financial services have a particularly high rate of e-business adoption. The evidence is less clear about company size and revenue, and surprising results were found between men and women and across selected job types.

Introduction

“Today an urgent challenge echoing around boardrooms across the world is, ‘What does e-business mean for *our* business? How do we e-enable our firm? What opportunities does e-business present for us, and what threats does it pose to our current business?’ For a vast proportion of established companies with long histories – the so-called incumbents – the challenge looms large. In some cases, it threatens their very survival. Never in history has incumbency been more perplexing.” – Mohan Sawhney and Jeff Zabim, *The Seven Steps to Nirvana: Strategic Insights into eBusiness Transformation* (2001, p. 1)

More than 25 years ago Levitt (1983) espoused the benefits of embracing technology in order to gain competitive advantage and capitalize on the opportunities resulting from the globalization of business. During the past 15 years, one of the most important influences on business has been the rapid development of the Internet and e-business technology. Uptake of

the Internet has been rapid, obliterating all the records for the rapid diffusion of a major technology, compared with communication technologies such as radio and television (Simeon, 1999). In a relatively short space of time the Internet, or more specifically, the commercial part of the Internet known as the World Wide Web, has evolved from being a novelty used purely as an entertainment and communication device by a handful of technology aficionados into a transforming concept that is now seen as an essential business tool (Simeon, 1999; Poon and Swatman, 1999; Aldridge *et al*, 1997; Herbig and Hale, 1997; Cotter, 2002; need more recent reference). The Internet is a powerful, transforming, “disruptive” technology, which initially degrades business performance, but promises greater long-term potential (Lee, 2001; Foremski, 2005).

The aim of this paper is to understand what characteristics within a business lead to a higher rate of e-business adoption. 1) What types of companies are best able to leverage the networking potential offered by e-business? 2) What industries are they in? 3) Are larger or smaller companies gaining advantage from the electronic marketplace? This paper comprises three parts. First, the relevant research in e-business is explored. Second, a range of companies and employee types are compared to see which types exhibit a higher rate of e-business adoption. Third, this comparison is analysed in order to determine the characteristics that predict which businesses will make the most of e-business.

Literature Review/Related Research

There are presently more than 1.3 billion people using the Internet worldwide (Cerf, 2008). Online media spending totals more than US\$25 billion per year (eMarketer, 2008) – more than 15 per cent of total marketing spend, a proportion that has doubled over a four-year period (Group M Interactive, 2008). In the US alone, consumer spending online is estimated to be more than US\$200 billion a year and is growing at more than 20 per cent a year (Legatt, 2007). Internationally, online sales growth has varied, but has increased significantly year-on-year in all OECD countries over the past decade (OECD, 2007). In most countries, the volume of Internet and other e-commerce sales transactions (including proprietary electronic data interchange - EDI) is also increasing as a percentage of total turnover. Business-to-business spending on the Internet is much more complicated to calculate, but indications are that sales growth is similar to or greater than consumer sales growth (OECD, 2007).

Apart from its utility in conducting transactions, the Internet is also used by customers and businesses for information and research. Indeed, a survey by the Pew Internet and American Life Project (2002) found that the Internet was most frequently used by consumers as a primary source of information. An overwhelming majority (97 per cent) of Internet users said that they expected to find the information they sought online. Moreover, even if a retailer did not sell products through its website, the provision of product information online would induce nearly half of all those surveyed to go to the physical store to buy the product (Pew Internet and American Life Project, 2002). Similarly, in a survey of small and medium enterprises (SMEs), Levenburg (2005) found that the Internet was most frequently used to find information about new sources of supply; indeed three of the top five applications of the Internet among this group of businesses were research-related. In summarising the importance of the Internet as a source of information, Carton (2002) has observed, "Exactly how and when the Web is worked into the buying decision process may be ultimately unknowable ... and ultimately unimportant. The point is consumers are going online expecting that information they want will be there."

Definition of terms

Definitions of **electronic marketplaces** range from the broad description of electronic markets information-technology-based governance mechanisms (Malone *et al*, 1987) to Bakos' more buyer-seller oriented "interorganizational information system that allows the participating buyers and sellers in some market to exchange information about prices and product offerings" (Bakos, 1997, p. 1)

Internet commerce, also known as **electronic commerce** [or in its widely-accepted shortened form, **e-commerce**] is "the sharing of business information, maintaining business relationships, and conducting business transactions by means of Internet-based technology" (Zwass 1996, p. 2). Kalakota and Whinston (1997, p. 3) offered a broader definition: "From a communications perspective, electronic commerce is the delivery of information, products/services, or payments via telephone lines, computer networks or any other means. From a business process perspective, electronic commerce is the application of technology toward the automation of business transactions and workflows. From a service perspective, electronic commerce is a tool that addresses the desire of firms, consumers, and management to cut service costs while improving the quality of goods and increasing the speed of service

delivery. From an online perspective, electronic commerce provides the capability of buying and selling products and information on the Internet and other online services. All of the above definitions are valid. It is just a matter of which lens is used to view the electronic landscape."

The concept of **e-business** is broader than e-commerce and more accurately reflects the breadth and diversity of activities available to business due to relatively recent developments in the use of network and communications technologies such as the Internet (Jones *et al.*, 2000). E-business has been defined as carrying out business activities – either in a transaction or non-transaction context – electronically, using network or telecommunication technologies while e-commerce refers specifically to financial transactions conducted via the Internet (Jones *et al.*, 2000). It is also described as marketing, buying, selling, delivering, servicing, and paying for products, services and information across (nonproprietary) networks linking an enterprise and its prospects, customers, agents, suppliers, competitors, allies and complementors (Weill and Vitale, 2001). Sawhney and Zabin (2001, p 15) couple the definition of e-business with the desired outcome, using electronic networks to create or improve a business process “to create superior value for current or potential customers”. By helping to build and manage relationships with customers, suppliers, employees, and partners, e-business can potentially transform a firm into a networked entity with seamless supply chains and value creation processes (Sawhney and Zabin, 2001).

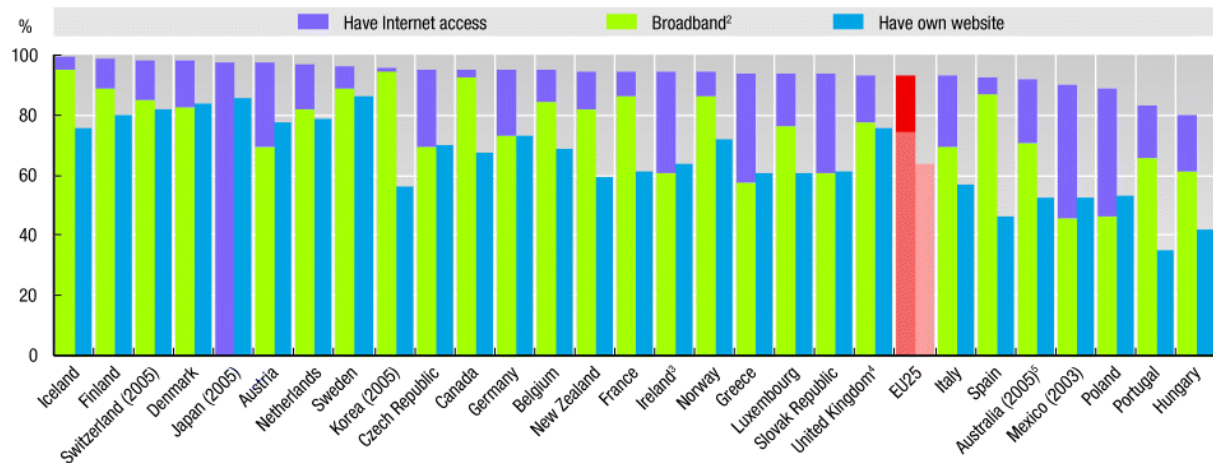
Business use of the Internet

Business use of the Internet (firms with 10 or more employees) has become standard practice in most OECD countries (OECD, 2007). Figure 1 shows the levels of Internet and broadband access in 28 OECD countries, as well as the percentage of businesses with a website. In 25 OECD countries out of 28, more than 90 per cent of businesses have Internet access, and Iceland, Finland, Switzerland, Denmark, Japan and Austria report access rates above 98 per cent. In a large majority of OECD countries, more than 50 per cent of businesses have their own website. Sweden and Japan have the highest proportion (>85 per cent), while Denmark, Finland and Switzerland record levels of 80 per cent or more. In most OECD countries for which data are available, over 90 per cent of large businesses (those with 250 or more employees) have access to the Internet. In over two-thirds of OECD countries, access rates

for large businesses exceed 95 per cent. Medium-sized firms (with 50 to 249 employees) also have very high rates.

Figure 1. Business use of the Internet and websites, 2006

As a percentage of businesses with 10 or more employees



Source: OECD, 2007 -

<http://miranda.sourceoecd.org/vl=10510068/cl=16/nw=1/rpsv/sti2007/ge7-a-1.htm>

The level of Internet penetration is relatively high in most sectors of the economy among businesses with 10 or more employees. The finance and insurance industry has the highest rates of Internet connectivity across the OECD area (95% or more in four out of seven countries reporting on this industry) (OECD, 2007).

Wholesale trade and the real estate, renting and business services industries had the next highest rate of Internet connectivity for most countries. Of the 27 OECD countries reporting on these industries, 18 have Internet penetration rates of 80% or more in wholesale trade as do 20 in real estate, renting and business services. The retail industry has slightly lower penetration than other industries in most countries.

E-business benefits for firms

E-business forces companies to find new ways to expand the markets in which they compete and to attract and retain customers by tailoring products and services more efficiently and effectively (Shin, 2001). Customers are transferring many of their purchases from traditional

channels to the Internet, which means that nearly all companies need to have an Internet presence as e-commerce becomes an integral part of doing business (Huizingh, 2002; Gunasekaran and Ngai, 2005). E-business and e-commerce have changed the basis of competitive advantage in many areas of business (Carneiro, 2006) and are spearheading what has been labeled the “innovation economy,” where “the speeds of technological advancement and connectivity are growing exponentially and with seemingly unfathomable velocity.” (Voelpel *et al*, 2006). E-business increases competitive intensity by allowing business customers to consider every available alternative to every offering (Raisinghani *et al*, 2005).

It can be difficult to quantify the business benefits of information technology (IT) initiatives. A Nobel Laureate in economics, Robert M. Solow (1987) argued that he could “see the computer age everywhere but in the productivity statistics”. A number of studies have concluded that there is little or no relation between the investment in IT and the performance of the company (Johannessen *et al.*, 1999). It has been found that IT “carries enormous productivity power, but like other powerful weapons, misfires in the wrong hand” (Powell and Dent-Micallef, 1997), and that “the mere purchase of a technology does not ensure its proper implementation” (Guzzo, 1996). The lack of empirical support for the positive impact of IT investments has been labeled the ‘productivity paradox’ of information technology (Brynjolfsson, 1993). Various explanations of the paradox have been proposed, such as the ‘must do’ argument (Strassman, 1997) whereby IT investments are undertaken largely because competitors are taking similar actions. It implies inevitability without having to examine causality.

As a subset of information technology, the same issues appear to apply to Internet and corporate e-business initiatives. By now, most businesses in the developed world have an Internet presence (Kraemer *et al*, 2006). However, the main reason for engaging in e-business appears to be “we need to be on the Internet”, without clear goals or research to back up the decision (Welling and White 2006a, 2006b). Despite the fact that the Internet enables the collection of large amounts of data, the intangible nature of some of the benefits of e-business such as new business opportunities and enablement of business process transformation make it difficult to measure the contribution of e-business initiatives to business performance and profitability (Grembergen and Amelinckx, 2002). This makes it important to understand which businesses are employing e-business technology and how it is benefiting their business.

Innovation, technology and e-business

Drucker (1954) suggested that business enterprise has only two functions: marketing and innovation. Innovation is defined as the adoption of an internally generated or purchased device, system, policy, program, process, product or service that is new to the adopting organization (Daft, 1982). Innovation is a means for changing an organization, whether as a response to changes that occur in its internal or external environment or as a pre-emptive move taken to influence an environment (Hult, Hurley and Knight, 2004). To be successful, a business must be innovative in the way it learns about and tracks customer needs; develops new products or services that address those needs; and develops and implements internal processes that enhance the understanding of customer needs and product development (Narver *et al.*, 2004). Innovation is viewed as critically important to an organisation's strategy in terms of its growth and survival in the marketplace (Damanpour, 1987; Eisenhardt and Brown, 1999; Voola, 2005). Innovation is seen as having a positive influence on financial performance, competitive advantage, reducing the time to market, and market share (Dutta *et al.*, 1999; Geyskens, Gielens and Marnik, 2002; Marinova, 2004; Moorman and Slotegraaf, 1999; Porter, 2001; Voola, 2005).

One definition of innovation is as a new technology or combination of technologies that offer worthwhile benefits (McDermott and O'Connor, 2002). E-business is a clear example of a technological innovation employed by businesses as a way of achieving competitive advantage. Technological innovation is widely considered a key to corporate success (Coviello, Milley and Marcolin, 2001; Rapp, Schillewaert and Hao, 2008). However, the use of technology and innovative processes has not by itself created a competitive advantage; firms have developed advantages by leveraging these technologies to enhance the intangible aspects of the firm, including human resources, strategic planning, etc. (Powell and Dent-Micallef, 1997).

Models of e-business adoption

One of the developing areas of e-business research has been the exploration of antecedents of participating in e-business. Several models of e-business adoption have been developed during the past decade. Many variables have been hypothesised to affect an organisation's level of e-business adoption, including: decision-maker, innovation and environmental

characteristics (Ching and Ellis, 2004); technological opportunism, deterministic pressures, perceived usefulness, complementary assets and firm size (Srinivasan *et al.*, 2002); firm characteristics and competitive environment (Wu *et al.*, 2003); ability and motivation (Grewal *et al.*, 2001); technological, organisational and environmental contexts (Zhu *et al.*, 2003); business technology strategy, top management support and technology compatibility (Teo and Pian, 2003); anticipated benefits, access to markets, external pressure, internal barriers and customer barriers (Tsikirktsis, Lanzola and Frolich, 2004); relative advantage, competitive pressure, channel conflict and technical resource competence (To and Ngai, 2006); and perceived external e-readiness and perceived organisational e-readiness (Molla and Licker, 2005).

Hypotheses

In order to understand the antecedents and outcomes of e-business adoption, it is important to determine what types of businesses and what types of roles in those businesses are most likely to embrace e-business. A number of hypotheses about rates of e-business adoption were developed based on the available literature.

Manufacturing vs. services

The Internet is becoming an indispensable tool for companies that emphasise a customer-service orientation (Levenburg, 2005). A study conducted in Singapore found that three of the top four major commercial uses of the Internet were services-related – including conducting electronic transactions, gathering feedback from customer, and providing customer service and support (Soh *et al.*, 1997). Customer-oriented businesses exhibit a higher rate of e-business adoption, and customer orientation has been positively associated with the service industry (Wu *et al.*, 2003). Goode and Stevens (2000) hypothesized that the service industry would be the largest adopter of the Web, with manufacturing lagging behind, although their data did not clearly support this hypothesis. Levenburg *et al.* (2006), however found support for Goode and Stevens' (2000) hypothesis, at least in terms of motivation for e-business adoption.

H1: Service businesses will have a higher rate of e-business adoption than manufacturing businesses.

E-business use and company type

In OECD countries, on average, more than 30 per cent of all businesses (with 10 or more employees) use the Internet for purchasing and about 17 per cent for selling goods or services (OECD, 2007). In most OECD countries for which data are available, the real estate, renting and business activities and the wholesale and retail industries make the most use of the Internet for purchasing. The wholesale and retail, manufacturing, and transport, storage and communications industries generally make the greatest use of the Internet for selling their products. Few countries report data separately for the retail industry. Australia, Canada and New Zealand report that fewer retailers than wholesalers sell and purchase over the Internet. The construction industry uses the Internet least for Internet selling and is also a low user of Internet purchasing. The finance and insurance industry has the highest rates of Internet connectivity across the OECD, while wholesalers and the real estate, renting and business services industries had the next highest rate of Internet connectivity for most countries (OECD, 2007).

It has been established that retailers who are more optimistic about the Internet's ability to enhance sales and profits attach greater importance to the use of e-commerce applications, and retailers who make more extensive use of Internet applications are more likely to reap e-commerce benefits, especially increased net profits (Levenburg, 2005). Wallace *et al* (2004) found that if retail customers have multiple channels (including the Internet) for interaction and purchase, they are much more likely to be satisfied and loyal. Because perceived value influences the satisfaction, retention and loyalty of customers, this is of significant strategic importance to most retailers (Gale (1994). Firms connected to the information technology industry are expected to have a higher degree of e-business adoption than those not connected to the sector (Fillis, 2004).

H2a: Retailers will have a higher rate of e-business adoption than other service businesses

H2b: Financial services companies will have a higher rate of e-business adoption compared to other service businesses

H2c: Wholesalers will have a higher rate of e-business adoption compared to other service businesses

H2d: Real estate, rental and business services companies will have a higher rate of e-business adoption compared to other service businesses

H2e: Information technology companies will have a higher rate of e-business adoption compared to the average rate across all businesses

E-business adoption and size of business

In small businesses (≤ 10 people), firm and managerial factors merge to act as one due to the concentration of control exerted by the key decision maker (Boone *et al*, 2000). Leonidou (1995), in an exporting study, identified attitudinal, structural, procedural and operational issues which inhibited export development by small businesses. It is believed that these factors are just as relevant in a study of barriers to e-business (Fillis *et al*, 2004). Sets of internal and external stimuli, together with the cognitive style of the decision maker, affect how a business will behave when presented with opportunities and threats in the marketplace. Many SMEs are slow to adopt e-business, either because the applications are too complex, or too expensive (Robertson *et al*, 2007). When SMEs do adopt e-business, they most often do so without conducting any strategic analysis (Meckel *et al*, 2004).

Larger organizations are heavier users of technology and have higher levels of satisfaction with technology than smaller organizations (Palvia and Palvia, 1999). Smaller companies are less likely to adopt e-business than their larger counterparts (Windrum and de Barranger, 2004). Firm size has been consistently recognized as a factor influencing technology adoption (Damampour, 1992). In the early days of electronic data interchanges, it was found that the proportion of EDI adoption in Fortune 1000 firms was 95 per cent, compared to only 2 per cent for small firms (Densmore, 1988). With regard to e-business adoption, larger firms have several advantages over small firms, including (1) more slack resources to facilitate adoption, (2) economies of scale, (3) greater capability of bearing the high risk associated with early stage investment in e-business, and (4) more power to urge trading partners to adopt technology with network externalities (Zhu *et al*, 2003). However, Zhu (2003) concluded that the adoption rate effect of firm size was lessened in countries with a high e-business intensity.

Levenburg *et al* (2006) found a significant difference in favour of larger businesses in terms of motivations for e-business adoption.

H3a: The larger the company in terms of employees, the greater the rate of e-business adoption

H3b: The larger the company in terms of revenue, the greater the rate of e-business adoption

E-business adoption and manager's gender

Gender has been found to be a statistically significant variable in IT adoption, with males exhibiting a higher rate of adoption (Palvia and Palvia, 2000). Gender of the CEO has been associated with e-commerce – males are more likely to embrace e-business (MacGregor and Vrazalic, 2007; Sonfield, Lussier, Corman and McKinney, 2001).

H4: Male managers will have a higher rate of e-business adoption

E-business adoption and job title

It is logical to assume that if a company, particularly a small company, has employees dedicated to e-business, it will be more likely to have a higher rate of e-business adoption. Regarding e-business adoption among CEOs, if positive perceptions and commitment to the pursuit of competitiveness and growth in the e-business environment are lacking at senior management level, it is not likely that commitment and activism elsewhere will lead to the development of e-business strategies (Damaskopolous and Evgeniou, 2003). If key decision-makers have poor perceptions towards technology, this is likely to result in reduced innovativeness of the organisation generally, and e-business adoption particularly (Robertson *et al*, 2007). E-business affects first the boundaries of the firm with the market in which it operates: the relationships of the firm first with its customers, and then suppliers and partners; Marketing and sales are the areas of a business most frequently impacted by e-business initiatives, while manufacturing is the least impacted (Damaskopolous and Evgeniou, 2003).

H5a: People with an e-business-related job title will have a higher rate of e-business adoption

H5b: CEOs will have a higher rate of e-business adoption compared to respondents in other roles

H5c: Marketing employees will have a higher rate of e-business adoption

Methodology

After reviewing the various models of e-business adoption, it was decided that Wu *et al.*'s (2003) model best suited our needs in that it measures e-business adoption in the context of the extent of its adoption. Wu, *et al.* (2003) developed a unified framework capturing the antecedents of e-business adoption, adoption intensity and business performance outcomes. Applying a framework capturing the intensity of e-business adoption across four business process domains (communications, administration, order-taking and procurement), they tested their model using data collected from senior managers in technology-intensive industries and found that the antecedents and performance outcomes of e-business adoption are best studied in a process-specific context. Wu *et al.*'s (2003) model has been empirically tested in contexts other than firm performance, such as competitive advantage (Muthaly *et al.*, 2004).

A quantitative survey instrument was developed that gathered data on Wu *et al.*'s (2003) e-business adoption measures, along with data on firm market orientation, innovation orientation and service orientation, as part of a broader research project. A seven-point Likert scale was used for the survey, as recommended by Ryan and Garland (1999), who suggested that a seven-point Likert scale was well-suited for survey research. The questions asked are shown in Table 1. The survey was pre-tested with a group of experts and e-business practitioners and some wording was slightly modified as a result. It was then pilot-tested with email databases of a B2B publisher in Australia and a Web development company customer and prospect email list.

Table 1 – Measure of overall e-business adoption (from Wu *et al* (2003))

Generally, to what extent do each of the following statements characterize the extent of e-business adoption – that is, the use of electronic technologies such as the Internet to conduct business – in your firm?
We have implemented e-business in all our business processes
E-business has had a very limited impact on our business operations [†]
Relative to the potential of e-business for our business, our e-business implementation is extensive
E-business has substantially changed our business processes
[†] Measured by high negative value

It was decided to use an Internet-based survey to conduct this research. The possibility of the results of a study on e-business adoption being biased by the use of an Internet-based survey was discounted due to the high levels of Internet and email use by Australian businesses. Krosnick (1999) promoted the use of survey methods other than traditional paper-based mail surveys, arguing that if it can be shown that there are other effective means of survey research, there are immediate benefits to be realized. New methodologies can potentially improve the validity of results, including improved response representativeness, which has been identified as more important than response rate (Cook *et al*, 2000). Internet-based surveys have become increasingly popular, demonstrated by the growing base of research on electronic survey methodology (Dillman *et al*, 1998; Couper, 2000; Couper *et al*, 2001; Dillman and Bowker 2001, Shih and Fan 2008). Practitioners find innovative Web formats such as HTML and Java Script very useful as they create a flexibility not available to paper-based surveys or telephone interviews (Schillewaert *et al*, 1998). Research subjects have also responded well to electronic surveys, with more than half of respondents citing ease of use as one of the things they like most about answering Internet-based questionnaires (University of Colorado at Boulder, 1996).

Senior managers were selected as the respondent group, since they would have a broad view of the business and would be able to assess the extent of e-business activities and their effect on the business. A wide cross-section of industries and firm types was desired in order to determine differences in e-business adoption rates between firm types. Firm types used on the survey came from the standardized list provided by the Australian Bureau of Statistics. Subjects were selected as a sub-set of 11,300 names of an email list compiled by Australia's

postal service; the subset was participants who listed their job seniority as a director, co-director or senior manager. An invitation email containing a link to the Internet-based survey was sent out to a randomised sample of 6,000 names from the list. No reminder email was sent as the terms of list rental were for a one-time use of the list. Five hundred and seventy people clicked on the link and commenced the survey online, a response rate of 9.5 per cent. Of this number, 378 respondents completed the survey, a completion rate of 65.8 per cent. Although this could be considered a low response rate, web-based surveys have been consistently found to have a lower response rate than mail-based surveys (Cook *et al.*, 2000, Shih and Fan, 2008). Several factors cited as being the ones most likely to result in low response rates – respondents who were professional workers, no follow-up reminder email, and non-personalised contacts (Shih and Fan, 2008; Cook *et al.*, 2000; Kittleson, 1997) – applied in this case. Compared to internet-based surveys conducted among university students (a group widely used by researchers because of the ease of access to academics), electronic surveys conducted among business professionals were found in a meta-analysis to suffer response rates 23 per cent lower (Shih and Fan, 2008). Professional groups in Australia have been shown to produce an overall response rate lower than 10 per cent, even when proper survey design and process is followed a follow-up reminder email is used (Aitken *et al.*, 2008). Despite the fact that Internet access has become increasingly prevalent, this lower response rate has remained consistent over time; Shih and Fan's (2008) meta-analysis found that study publication year was statistically insignificant in accounting for the response rate differences between Web and mail survey modes across all comparative studies.

Results

Table 2 displays a summary of support for the hypotheses, while Tables 3-8 display the results from the survey. In terms of our hypotheses, H1 posits that service businesses will have a higher rate of e-business adoption than manufacturing firms. Our results support this hypothesis (47 per cent rate vs. 42 per cent). H2a proposes that retailers would be among the top company types in their rate of e-business adoption. Our results do not support this hypothesis (retailers came 9th out of 13 company types with a 46 per cent rate). H2b suggests that financial services firms would be among the top company types in their rate of e-business adoption, and our results strongly support this hypothesis, as financial services was the top-ranked company type with a 66 per cent rate of e-business adoption. We hypothesized

in H2c that wholesalers would be among the top company types in their rate of e-business adoption, and our results do not support this hypothesis (wholesalers were ranked 8th out of 13 with a 48 per cent rate). H2d proposes that real estate, rental and business service firms would rate highly on e-business adoption; our results support this hypothesis. H2e proposes that information technology companies would have a high rate of e-business adoption, and our results support this hypothesis.

Table 2 – Summary of support for hypotheses

Hypothesis	Empirical support
H1: Service businesses will have a higher rate of e-business adoption than manufacturing businesses.	Yes
H2a: Retailers will have a higher rate of e-business adoption than other service businesses	No
H2b: Financial services companies will have a higher rate of e-business adoption compared to other service businesses	Yes
H2c: Wholesalers will have a higher rate of e-business adoption compared to other services businesses	No
H2d: Real estate, rental and business services companies will have a higher rate of e-business adoption compared to other service businesses	Yes
H2e: Information technology companies will have a higher rate of e-business adoption compared to other businesses	Yes
H3a: The larger the company in terms of employees, the greater the rate of e-business adoption	Partial support
H3b: The larger the company in terms of revenue, the greater the rate of e-business adoption	Partial support
H4: Males will have a higher rate of e-business adoption	No
H5a: People with an e-business-related job title will have a higher rate of e-business adoption	Yes
H5b: CEOs will have a higher rate of e-business adoption	No
H5c: Marketing employees will have a higher rate of e-business adoption	Yes

H3a proposes that e-business adoption is related strongly to company size, with larger companies reflecting a higher rate of adoption. This hypothesis is partially supported. Overall, companies with more than 300 employees had a significantly higher rate of e-

business adoption than those with less than 300 employees; however, the 151-300 bracket had a lower rate of e-business adoption than those of companies with less than 150 employees, so the rate does not uniformly rise along with company size. This finding may be affected by the fact that the 151-300 employee bracket was made up of only 10 responses, which may have affected the significance of the final result. H3b posits that the greater a company's revenue, the higher its rate of e-business adoption. This hypothesis is not supported, with no clear pattern in revenue to e-business adoption. In fact, the revenue bracket exhibiting the highest rate of e-business adoption is the \$100,000-\$499,000 bracket, which classifies as a small business.

We proposed in H4 that males would report a higher level of e-business adoption at their businesses; the results do not support this hypothesis, with females reporting a significantly higher e-business adoption rate (54 per cent vs 40 per cent). H5a hypothesized that employees with an Internet-related role would report a higher e-business adoption rate; the results strongly support this hypothesis, with Internet-related roles exhibiting the highest rate of e-business adoption (65%). H5b suggests CEOs would report a higher e-business adoption rate; the results do not support this hypothesis (a 46% rate, 5th out of 7 roles). H6c proposed that marketing employees would report a high e-business adoption rate; the results support this hypothesis (a 53 per cent rate, 3rd out of 7 roles). Table 8 contains a summary of results.

Table 3 – Responses by industry orientation

Industry orientation	Q1 - % Agree	Q2 - % Disagree	Q3 - % Agree	Q4 - % Agree	Average
Manufacturing	56%	44%	29%	39%	42%
Service	57%	48%	37%	47%	47%

Table 4 – Responses by company type

Company type	Q1 - % Agree	Q2 - % Disagree	Q3 - % Agree	Q4 - % Agree	Average
Financial and Insurance Services	79%	58%	63%	63%	66%
Arts and Recreation Services ¹	70%	90%	20%	70%	63%
Information Media and Telecommunications	60%	60%	53%	67%	60%
Transport, Postal and Warehousing	58%	58%	53%	58%	57%
Rental, Hiring and Real Estate Services	57%	50%	43%	64%	54%
Agriculture, Forestry and Fishing	62%	58%	38%	42%	50%
Health Care and Social Assistance	72%	40%	36%	52%	50%
Wholesale Trade	55%	59%	18%	59%	48%
Retail Trade	58%	42%	39%	43%	46%
Mining ¹	60%	40%	28%	40%	42%
Accommodation and Food Services ²	36%	27%	55%	36%	39%
Manufacturing	44%	28%	44%	33%	37%
Construction	30%	25%	15%	25%	24%
Non-significant responses (<10): Administrative and Support Services; Education and Training; Electricity, Gas, Water and Waste Services; Professional, Scientific and Technical Services; Public Administration and Safety ¹ Only 10 responses in these categories ² Only 11 responses in this category					

Table 5 – Responses by company size

Company size	Q1 - % Agree	Q2 - % Disagree	Q3 - % Agree	Q4 - % Agree	Average
<50 people	56%	47%	34%	46%	46%
51-150 people	55%	48%	31%	48%	46%
151-300 people*	50%	31%	38%	38%	39%
301-500 people	75%	58%	42%	67%	61%
>500 people	61%	48%	50%	34%	48%
* Only 12 responses in this category					

Table 6 – Responses by company revenue

Revenue band	Q1 - % Agree	Q2 - % Disagree	Q3 - % Agree	Q4 - % Agree	Average
Less than \$100,000	52%	43%	32%	45%	43%
\$100,000-\$499,999	62%	50%	33%	49%	49%
\$500,000-\$999,999	52%	48%	24%	28%	38%
\$1 million-\$4.99 million	51%	45%	33%	40%	42%
\$5 million-\$9.99 million	50%	45%	40%	50%	46%
\$10 million-\$99.99 million	62%	40%	50%	60%	53%
\$100 million-\$499.99 million*	40%	60%	20%	30%	38%
>\$500 million	67%	50%	50%	46%	53%
* Only 10 responses in this category					

Table 7 – Responses by respondent gender

Respondent gender	Q1 - % Agree	Q2 - % Disagree	Q3 - % Agree	Q4 - % Agree	Average
Female	63%	55%	41%	55%	54%
Male	50%	40%	31%	37%	40%

Table 8 – Responses by respondent job title – e-business-related

Job title	Q1 - % Agree	Q2 - % Disagree	Q3 - % Agree	Q4 - % Agree	Average
E-business manager/Webmaster	83%	58%	67%	50%	65%
Consultant	82%	64%	45%	55%	62%

Table 9 – Responses by respondent job title – CEO vs. administrator

Job title	Q1 - % Agree	Q2 - % Disagree	Q3 - % Agree	Q4 - % Agree	Average
CEO/Managing director	58%	49%	32%	45%	46%
Administrator	50%	48%	31%	44%	43%

Table 10 – Responses by respondent job title – Marketing vs. sales and manufacturing

Job title	Q1 - % Agree	Q2 - % Disagree	Q3 - % Agree	Q4 - % Agree	Average
Marketing manager/co-ordinator	68%	40%	48%	56%	53%
Sales manager	54%	37%	51%	49%	48%
Manufacturing manager/engineer	25%	25%	25%	25%	25%

Discussion and Conclusions

Rates of e-business adoption

This study uncovered a number of significant characteristics of businesses that result in higher rates of e-business adoption. Not surprisingly, service businesses are more likely to take advantage of the benefits offered by e-business than manufacturers. However, retailers, which were expected to perform well, were among the worst-performing of the services, while financial services and information technology topped the list. Also, there was a clear gap between men and women respondents in terms of e-business adoption, with women scoring highly, in contrast to previous research. This merits further exploration. Also, the evidence around company size was not very clear, with most larger company brackets for both company size and revenue exhibiting higher rates of e-business adoption, but not all of them and not in a uniform manner. This may be because although earlier research clearly indicated gaps in adoption rates, as e-business has developed and increased in scope and flexibility, the opportunities for small and medium-size businesses to adopt e-business have increased (McCole and Ramsay, 2005).

Limitations, conclusions and further research

A large number of survey invitations were required to elicit a significant response; however, it was important for the purposes of this study to gain access to a large cross-section of senior professionals, which meant there was no opportunity for follow-up reminders with this response group which is known for low survey response. The study was limited geographically in that only Australian businesspeople were surveyed; however, this was mitigated by the overall number of responses and the broad range of Australian industries that were represented. It could be argued that a limitation to this study is the fact that the analysis was limited to Wu *et al's* (2003) measure of overall e-business adoption and did not include the measures developed for communications processes, internal administration processes, order-taking processes and procurement processes. It was decided for the present survey to initially focus on overall characteristics of e-business adoption, and this limitation will be addressed in follow-up research.

This study revealed important information about what types of firms are most likely to fully embrace e-business. Our findings suggest that not all businesses are benefiting equally from the new ways of business offered by e-business and networking technologies. They also suggest that small and medium businesses, previously thought to be slow to adopt e-business compared to large enterprises, are taking advantage of iterative technology developments and bridging the gap.

Further research should look at a wider range of antecedents of e-business adoption and compare the results to this initial survey. E-business adoption could also be studied in the context of more established business research areas, such as market orientation. E-business adoption should also be studied in the context of business outcomes, such as company performance. The most important reasons that companies adopt e-business are to increase operational efficiency, increase customer service and to expand into new areas, so it is important to measure whether, in fact, e-business adoption leads to a measurable improvement in business performance. This will enable researchers to determine which facets of e-business companies should focus on as they attempt to optimise the effects of technological opportunities on their business. As Tsikriktsis *et al* (2004, p.226) writes: “Now that the relative novelty of using the Internet to conduct business has worn off, the real challenge remains ahead. Namely, we as a community of research need to help managers begin figuring out which e-process strategy is optimal depending upon various contexts.”

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