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The effect of electronic commerce on small Australian enterprises

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Abstract

In Australia, although electronic commerce (e-commerce) has generated a plethora of media articles there has been comparatively little research into its effects on organisations. E-commerce comprises several different technologies (especially those associated with the internet); this paper investigates the frequency of use by and usefulness of these technologies in small Australian businesses. The technologies are differently associated with intermediate variables such as the attraction of new customers and the ability to participate in overseas markets. The statistical evidence that e-commerce is positively correlated with some intermediate variables is overwhelming. We consider the statistical relationships between intermediate variables and final variables (revenues, costs and competitive advantage). There are significant correlations between some sets of intermediate and some final variables; most of these correlations had plausible explanations. There are clear implications for small businesses, for example, the internet allows them to maintain a low-cost foreign presence but it allows foreign firms to compete (at marginal cost) in Australia.

Previous Next

Keywords

Electronic commerce; Small business; Australia

1. Introduction

1.1. Definitions

Electronic commerce (EC) is defined by Electronic Commerce (1995) (http://www-cec.buseco.monash.edu.au/links/ec_def.htm) as “the process of electronically conducting all forms of business between entities in order to achieve the organisation’s objectives.” EC includes technologies such as electronic data interchange (EDI), electronic funds transfer (EFT), electronic mail (e-mail), internet activities (such as web pages, frequently asked questions (FAQ) pages, online catalogues, on-line ordering, order tracking, tendering, on line interaction exemplified by booking and banking services and any other form of electronic data transmission.

The Australian Bureau of Statistics defines a small business as a construction and service businesses having less than 20 employees or a manufacturing business having less than 100 employees.

The internet or world-wide-web (WWW) is a network of networks of computers whereby messages and data can be interchanged. It has several well-known characteristics that have made its use increase exponentially.

1.2. Background

Much of EC takes place on the WWW. The characteristics of the Internet that make it so potent are user-friendliness and near universal availability. The necessary hardware (a PC and a phone line) and software are cheap to install and easy to use (in particular

search engines make it easy to find wanted information). Software facilitating construction of web pages is cheap and user friendly.

The information, services and software available on the web are increasing. Available information includes news headlines, stock prices, train timetables, sports scores and weather forecasts. Services include booking travel, paying bills, banking and ordering goods. New software is creating new web applications such as cheap (web-based) phone calls, web TV and the ability to store, download and play music.

EC attracted much Australian media attention in 1999. Between 1 December 1999 and 10 January 2000, there were 103 articles in the Australian Financial Review (Australia's daily financial newspaper) that mentioned e-commerce in their title or first paragraph. Two summary articles are by Carney (2000) and Van Wyngen (1999). Some of these articles described the stock market mania for shares in (usually profitless) companies intending to engage in EC. In Australia several new floats intend to use EC to enter markets for booking services, retailing (e.g. wine), the gay community, on-line gambling and pornography.

E-commerce is well established in the Australian financial sector. Share brokers abandoned the traditional trading floor two days after screen based trading was introduced and a growing proportion (perhaps 40%) of their clients place orders on-line; an increasing proportion of customers bank and pay bills on-line. There is considerable discussion of the effect of EC on 'bricks and mortar' based businesses and some Australian retailers have augmented basic services with internet services ('clicks and mortar'). Supermarkets have implemented internet based order and delivery services. Many businesses now encourage orders (for goods, shares, theatre seats and newspaper advertisements) through web pages as well as over the phone.

There is some evidence that Australian consumers used the net to do significant Christmas 1999 shopping (Braue, 1999, Crowe, 2000). The threat of web-based competition from overseas suppliers such as Amazon.com is a powerful driver for Australian firms. Although reliable figures are elusive, it is estimated that, in 1998, $1.6 trillion worth of electronic transactions were conducted in Australia; of which $55 billion was from the business-to-consumer segment. Eleven percent of all businesses had a web presence and 35% of these claimed that the internet was significant to their business (Marzbani, 1998).

1.3. The impact of e-commerce businesses

E-commerce has myriad direct and indirect, internal and external effects on individuals and organisations. The effect of a new technology such as e-commerce on an individual organisation can be assessed by considering its effect on products, services and the '7-S' (structure, systems strategy, style, staffing, skills, and superordinate goals) (Waterman et al., 1980).

1.3.1. Abolition of distance and time

The web can eliminate time and distance obstacles to business. A web page can take orders or answer questions originating at any time or place, search engines make it likely that a potential customer searching for a product or service will find an organisation's well-indexed page. The costs of internet transactions are independent of distance. The advantages may be smaller for firms selling goods rather than services: delivery costs and times, exacerbated by having to deal with customs offices, may present insuperable difficulties, however, there is substantial trade in small tangible items with high intrinsic value such as books, CDs and software.

Prior to the internet, a major obstacle to Australia's small and medium sized enterprises (SMEs) entering international markets was their lack of resources (Anonymous, 1997), isolation and the impracticability of maintaining an overseas or even interstate presence. Stories of unreliable agents and representatives are legion. A web page can provide a national and international presence (Clayton, 1998, Karakaya and Karakaya, 1998, McCollum, 1998).

1.3.2. Supply chain management

E-commerce can change relationships in the supply chain (Benjamin and Wigand, 1995, Ghosh, 1998). A mundane effect of information technology (IT) is reduction of costs across the whole supply chain (Flaherty, 1995; Chapter 4). The cost reduction is attributable to prompter and more accurate information (and hence forecasts) and optimisation of inventory levels, production plans and transport costs across the whole supply chain (in contrast to each participant locally optimising) (Benjamin and Wigand, 1995).

The internet can change relationships amongst supply chain partners in unforeseen ways (McCollum, 1998). The internet (and cheaper phone calls and faxes) facilitates sharing information between companies, suppliers and customers. It can link businesses and trading partners from disparate industries, allowing them to form (for some purposes) a single entity or consortium (Parfett, 1996) whose members share information previously treated as confidential. It allows firms of differing locations, sizes and technical expertise to collaborate (Robins, 1998), (Poon and Swatman, 1996), typically in the development of complex new products or services.

A tradition supply chain comprises raw material suppliers, manufacturers, wholesalers, retailers and customers. The internet can undermine this comfy linear arrangement. Manufacturers can disintermediate retailers by establishing web pages to sell directly to customers. Participants (notably General Electric which reduced the cost of supply contracts by between 10 and 50%) can use the internet to identify alternative suppliers or customers (Ghosh, 1998). The internet is a low-cost way of comparison-shopping, it is easy to search for alternative supplies on the internet, bypassing, or at least threatening, traditional suppliers. In electronic markets,

competition is usually intensified because it is much easier to search for lower cost and higher quality supplies (Kwok, 1997, Malone, 1989, Sterrett and Shah, 1998).

By more closely coordinating activities, actors can better exploit techniques such as just in time (JIT) and TQM (quality problems may only be solvable through cooperation between supplier and customer). Two firms may thus move imperceptibly from an arms-length to a more cooperative relationship (Chen and Williams, 1998, Swatman, 1996). Gamble (1999) notes the possible conflict between 'seller-centric' and 'buyer-centric' models and the attempts to create portals (exemplified by Chemdex) in which multiple sellers meet multiple buyers.

1.3.3. Process acceleration and automation

The internet facilitates shortening product development cycles, simplifying the ordering process, shrinking inventory (Margherio, 1998) and implementing time based competition (TBC) (Carter et al., 1995). EDI, a standard tool for converting paper-based transactions to electronic format, shortens business process cycle times (Mak and Johnston, 1997, Senn, 1998, Swatman, 1996, Young et al., 1999) and reduces or eliminates data errors caused by manual re-keying of data (Behrendorff, 1996, Gamble, 1999). If companies that dominate an industry's supply chain are closely and efficiently linked, the supply chain can be a barrier to entry to the industry (Ayers, 1999).

1.3.4. Marketing and promotion

The internet, or 'great equalizer' (Anonymous, 1997, Schultz, 1997), can provide small businesses with low cost worldwide visibility (Hormozi, 1998). An internet presence gives cheap advertising and market exposure (Sterrett and Shah, 1998); one out of four Dell Computers' orders were solicited through the internet (Margherio, 1998). If an internet page contains promotional material and a way for the reader to either place an order or express interest, it is (unlike most other forms of promotion) easy to measure the page's impact.

1.3.5. Customer relations

Interaction on the internet helps develop and maintain customer relationships and data (Burgess and Coopers, 1998). FAQ pages provide customers with answers to often asked questions on the product, such as its features, uses, and technical support. Symonds (1999; p 10) describes how CISCO (a computer equipment supplier) was growing so rapidly that providing after-sales support was the bottleneck. CISCO used the internet (particularly FAQ pages) to reduce the cost of customer support by automating the answering of common questions. As often happens, this new technology was used in unanticipated ways: customers used the net to share their experiences with CISCO and other customers.

Customers can post comments on the company's product and service on a web page; the company responding by posting the reply on the page or e-mailing the customer (Hormozi, 1998). It is natural to statistically analyse such comments. This analysis may reveal a product design fault, an opportunity to market a product variant or misconceptions of the product's use or purpose. Amazon.com analyses customers' past purchases in order to recommend appropriate new books, ironically seeming more responsive to individual tastes than the small store proprietor.

1.3.6. Competitive advantage

Bakos and Treacy (1986) opine that competitive advantage springs from comparative efficiency and bargaining power (Fig. 1). Comparative efficiency results from the firm being able to produce and deliver goods and/or services at a lower cost than rivals. Bargaining power means that the firm has some exploitable monopoly power (Johnston and Vitale, 1988). E-commerce competence in can increase bargaining power in myriad ways, e.g. a firm able to buy from many suppliers increases its bargaining power over individual suppliers (Guthrie and Austin, 1996). SMEs can increase their bargaining power by forming bulk purchasing alliances (Poon and Swatman, 1996).

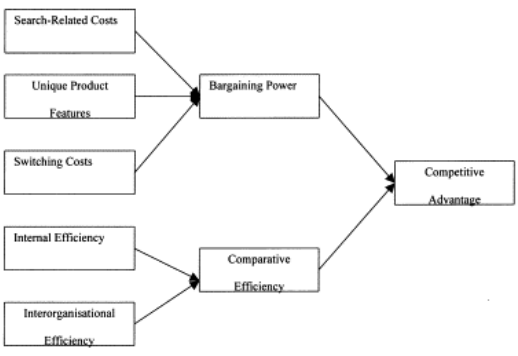

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Fig. 1. A causal model of competitive advantage.

Lower costs and/or product/service differentiation can create competitive advantage. Costs are lowered through altering or streamlining any of the activities in the value chain (Porter and Millar, 1985). Electronic techniques such as EDI can lower costs and provide intangible advantages such as quicker processing. One charm of on-line ordering is having customers and suppliers (who have a vested interest in getting details right) do data entry work.

Changing scopes can create competitive advantage; Porter and Millar (1985) identifies segment, vertical, geographic and industry scopes. SMEs can extend their geographic scope by using e-commerce to enter interstate and international markets at marginal cost. In electronic markets, the threat of new entrants is high because the barriers to entry are intrinsically low (compared with establishing a brick and mortar outlet (Guthrie and Austin, 1996)), this is already apparent to businesses dealing in flowers, compact disks, books and software; Australian retailers have to compete with Microsoft, Interflora and Amazon.com.

The internet's almost costless distribution of intangible products interacts with the emergence of some modern technologies (e.g. optical fibre, software manufacture and the internet itself) with high fixed and low marginal costs. Such technologies tend to lead to market structures dominated by a few big players. The delivery mechanisms required to fulfil orders taken over the internet have increasing returns to scale suggesting that delivery is likely to be dominated by a few firms such as United Parcel Service and Fedex.

In contrast, the internet hosts approximations to the economist's perfect market, it is easy and cheap to participate and there are negligible barriers to entry. This may change if, for example, Amazon.com dominates e-trade in books, and develops an overwhelming advantage through economies of scale and comprehensive customer histories or if users enter through a few popular portals and (as does 'screen bias' in reservation systems) are steered towards preferred suppliers.

For the business-to-customer segment, the internet is likely to augment, not replace brick and mortar shopping as people still like to see and touch the products before they make their purchases (Karakaya and Karakaya, 1998). Wenninger (1999) usefully distinguishes the differences between business to business (B2B) and retail e-commerce (B2C). A third form of e-commerce, known as customer to customer or C2C, exemplified by auctions sites, is emerging.

1.4. Past work

We briefly describe the growing impact of e-commerce on business and review past research into e-commerce, emphasising that done in Australia. The research questions motivating the study and definitions of the variables used are given.

1.4.1. Perceived effects of e-commerce for small businesses

Poon and Swatman, 1996, Poon and Swatman, 1997a, Poon and Swatman, 1997b, Poon and Swatman, 1998 conducted a longitudinal study spanning 20 months (1995–1997) on small Australian businesses' expectations of internet commerce (e-commerce over the internet). Phase one of the research comprised a survey and case studies; phase two was a follow-up survey. As little research had previously been done on internet commerce, multiple methods were used to present a holistic picture.

In 1995, phase one was conducted by surveying the use of internet commerce amongst small Australian businesses. The survey's purpose was to obtain profiles of small businesses that used internet commerce and ascertain what motivated their adoption of e-commerce. More than half of the 146 informants were from micro-sized companies (one to five people). The five most important drivers for adopting internet commerce were: (1) new modes of direct and indirect advertising, (2) low cost communication, especially electronic mail, (3) easy access to potential customers, (4) company image enhancement, and (5) formation and extension of business networks. The least important drivers were: (1) benchmarking competitors' performance, (2) inter-office document exchange, (3) access to government and trade data, (4) product delivery, and (5) online sales and transactions (Poon and Swatman, 1997b). More than half of the respondents surveyed felt that internet commerce provided them with a competitive advantage (Poon and Swatman, 1997a).

The second half of phase one comprised interviews of 23 participants. The purpose was to ascertain important reasons for continuing internet use, and to elucidate what small businesses meant when they said they had gained competitive advantage. The study found that respondents used the internet as a communication medium (in particular, e-mail was used to communicate with customers and business partners) and a platform for marketing and advertising. The competitive advantage gained could be translated into effects (classified as direct/indirect and short-term/long-term) experienced by small businesses. Short-term direct effects include lower communication costs and the ability to generate short-term new revenue. Long-term direct effects included the ability to retain customers and to offer better products or service delivery. Short-term indirect effects include new potential business opportunities, such as new markets, advertising and marketing. Long-term indirect effects were related to ongoing business transformation and new business formation. Although the effects were unquantified, participants believed that not having an internet presence was a competitive disadvantage (Poon and Swatman, 1997a).

The purpose of phase two (Poon and Swatman, 1998) was to determine whether respondents' opinions on internet commerce had changed appreciably. The internet did not meet businesses expectations concerning sales and marketing, and companies did not

experience savings in communication costs. The internet did help improve customer relationships, but failed to improve supplier relationships. The internet was considered a competitive necessity rather than a competitive advantage. Only retailers and wholesalers viewed it as an effective marketing tool. Little correlation was found between the number of customers online and the effectiveness of the internet as a marketing medium.

1.4.2. Internet commerce business opportunities

Kwok (1997) statistically studied the effects of internet commerce on activities in companies' value-chains, 80 Asia-Pacific companies responding to questionnaires. Only some value chain activities were affected by internet commerce. These were promoting and marketing; customer supporting and communications. There was little effect on procurement, human resource management, inbound logistics or production. The effects of and barriers to internet commerce were also studied. The effects found were enhancement of corporate images; promotion and advertising of products and services; and increased potential markets for products and services. Few companies had actually experienced increased sales and profits (these may have been affected by the impending Asian meltdown). The barriers identified were inadequate speed of transmission on the internet, difficulties in persuading customers to use internet commerce, and risks of intruders and hackers.

1.5. Business use of the internet

Abell and Lim (1996) conducted an exploratory study of business use of the internet, 116 New Zealand businesses returning a questionnaire. Most responses were from micro-companies (five or fewer people). The elements of Internet commerce most used were electronic mail (used by most respondents), the WWW, and file transfer protocols. The internet was used as a platform for gathering and providing information. The major perceived effects of the internet were effective distribution of information; better service and support from suppliers; greater customer satisfaction; and an ability to participate in international markets. A web page was the Internet resource most used for marketing and advertising. The main reason for not having fully benefited from the internet was that suppliers and customers were not connected to it. Some of the technologies examined, such as file transfer protocols, are obsolete.

1.6. Studies conducted by industry

Industrial studies of e-commerce include the Yellow Pages report on Australian businesses (Yellow Pages, 1999, the PriceWaterhouseCoopers' (1998) report on Singapore businesses, and reports prepared by KPMG on businesses in the United Kingdom (KPMG United Kingdom, 1997, KPMG United Kingdom, 1998 and Europe. Only the first is considered here.

1.6.1. E-commerce in Australian small and medium businesses

A recent survey of Australian small and medium businesses' use of e-commerce was summarised by Yellow Pages Australia (Yellow Pages, 1999. The purpose was to investigate e-mail and internet usage, and the factors affecting the adoption of e-commerce. The sample comprised 1200 small and 600 medium sized businesses.

Forty-three percent and 84%, respectively, of small and medium businesses used e-mail; 48 and 82%, respectively had internet connections. Service providers were the heaviest users of e-mail and the internet. Twelve percent of small businesses already used e-commerce to sell goods and/or services, while 36% of small businesses felt they could use e-commerce to sell goods and/or services.

The most often cited reasons for rejecting e-commerce were, 'not suited to the business', 'need for personal contact', 'payment and security issues' and 'clients are local'. The major perceived advantages were, 'expanded geographical coverage', 'provides competitive advantage', and 'reduced selling costs'.

1.7. Summary and research questions

The literature and observation suggests that internet e-commerce has many potential benefits and some costs for SMEs. These can be classified as internal/external and tangible/intangible (Table 1). Listing the effects of e-commerce is, in some sense, beside the point; businesses may have to adapt to it. "It's going to turn our business inside out; the way we deal with customers and suppliers will change; functional and hierarchical structures are becoming dysfunctional; we are being forced to compete in a global market." (Anonymous, 1997; personal communication).

Table 1. Effects and costs of e-commerce

	Internal	External
Tangible	Reduced cost of communication amongst staff and functions. Reduced advertising costs. Cost of establishing and maintaining e-commerce.	Reduced cost of communicating with customers and suppliers.

	Internal	External
Intangible	Acceleration of business processes.	New modes of promotion (advertising on the web).
		New ways of developing and maintaining lists of clients.
		Elimination of geographic restrictions.
		Entry of overseas competitors at marginal cost.

In this study we classified effects on businesses as either intermediate or final. Final effects comprised higher revenue, lower costs, and improved competitive advantage in both short and long-term perspectives. Intermediate effects, exemplified by improved communications with customers, suppliers, business partners and employees, are those (mostly intangible) that are likely to generate final effects.

These considerations led us to consider the following research questions: RQ1: What elements of Internet e-commerce do SMEs most use? RQ2: What are the intermediate effects of internet e-commerce? RQ3: What are the final effects of internet e-commerce? RQ4: What are the relationships (if any) between intermediate and final effects?

1.8. Hypothesised effects of e-commerce

The research was based on a simple model. It was hypothesised that use of each EC technology produced intermediate effects and these produced direct effects (revenues, costs and/or strategic advantage). The EC technologies and intermediate effects considered are listed in Table 2. The final effects are listed in Table 3.

Table 2. Intermediate effects summary statistics

EC technique	Number using the technique	Intermediate effects	Number using	Mean response	SD
Web page	66	Attract new customers	66	2.95	1.25
		Expand local markets	65	2.63	1.28
Have an FAQ page	14	Tailor product/services to customers	13	2.62	1.61
		Stay in touch with customers	13	3.00	1.35
		Receive timely feedback	13	2.46	1.56
Advertise on the internet	39	Reduce advertising cost	39	2.15	1.33
Use the internet	59	Expand products/services	56	2.48	1.48
		Alternative supplies	55	2.38	1.38
		Enter overseas markets	56	2.45	1.55
		Overseas competitors into Australian market	53	3.00	1.49
		Bypass traditional supplier	56	2.21	1.45
		Sell direct to customer	54	2.20	1.50
Use internet EDI	15	Cut order & delivery time	15	2.93	1.58
		Reduce data entry cost	14	2.43	1.45
		Increase data transfer speed	14	3.50	1.56
		Reduce data entry errors	14	2.57	1.45
		Hold less inventory	13	1.54	1.13
E-mail	62	Stay in touch with customers	62	3.45	1.34
		Stay in touch with suppliers	57	2.95	1.57
		Stay in touch with business partners	57	3.19	1.55
		Stay in touch with employees	55	2.53	1.65

Table 3. Final effects summary statistics

Final effects	Number experiencing	Mean response	SD
Short-term new revenue	43	1.77	1.09
Long-term new revenue	60	2.62	1.40
Short-term costs reduced	14	1.93	1.21
Long-term costs reduced	25	2.32	1.63
Short-term competitive advantage	40	2.13	1.34
Long-term competitive advantage	44	2.55	1.39

2. Methodology

2.1. The survey

Data used to test hypotheses were collected using a survey (a copy of which is available from the authors). The survey sought responding organisations' demographic data; data on the use of aspects of e-commerce and the intermediate effects of each aspect; and the respondent's opinion of the direct effects obtained from e-commerce. Most data was collected using five-point Likert scales, for example: 'Having a web page has helped us to attract new customers' was anchored by 1 (not at all) and 5 (to a very large extent).

Two hundred and fifty managing directors of small and medium Australian enterprises that use e-commerce were surveyed. The sample was drawn randomly from Yellow Pages Internet and phone directory and Aussie.com.au↗ (a list of Australian Internet sites). Seventy-five questionnaires were returned (response rate 30%). Although the sample was drawn from a list of e-commerce users, the responses of five non-users were discarded. There may be responder bias: managers wrestling unsuccessfully with e-commerce may be reluctant informants.

2.2. Reliability and validity

Because we were unable to locate other questionnaires, our questionnaire was a self-designed instrument and previous reliability coefficients could not be obtained. Guttman's split-half method was used to quantify internal consistency among items in the questionnaire, sections two (comprising questions on intermediate variables) and three (final variables) had reliability coefficients of 0.8039 and 0.8362, respectively. As these exceeded 0.7, it is safe to infer that the questionnaire was internally consistent (Cortina, 1993).

A major concern in the development of a new measure is content validity. Hinkin (1995) suggests that "a measure must adequately capture the specific domain of interest yet contain no extraneous content". A deductive approach was used in the development of the survey questions, the relevant literature was reviewed and the items were developed based on the literature.

3. Analysis

3.1. Demographics

Table 4 shows the length of time that responding organisations have been using e-commerce and Table 5 gives the industrial sectors of the responding organisations. Of 75 respondents, 30 came from retail and wholesale trade sectors for which the internet has been heavily touted as an alternative to traditional brick and mortar shopping. Table 6 shows that small firms comprised 81.3% of the informants, the rest being medium sized companies. This proportion is representative of Australian small businesses. Table 7 shows that many firms that use e-commerce operate outside their locality suggesting that micro-organisations especially use e-commerce to extend their operations geographically.

Table 4. Duration of e-commerce usage

Time (years)	Frequency	%
<1	16	21.3
1–2	23	30.7
2–3	18	24.0
3–4	6	8.0
4–5	6	8.0
5–6	1	1.3

Time (years)	Frequency	%
Total	70	100.0

Table 5. Industry type

Industry	Frequency	%
Technology equipment & communication services	4	5.3
Retail trade & wholesale	30	40.0
Primary	5	6.7
Finance, property, business	5	6.7
Recreational	7	9.3
Manufacturing	9	12.0
Personnel & other services	5	6.7
Transport & storage	1	1.3
Construction	1	1.3
Other	7	9.3
Missing	1	1.3
Total	75	100.0

Table 6. Organisation size

Number of employees	Frequency	%
1–5	40	53.3
6–20	21	28.0
21–50	7	9.3
51–100	3	4.0
100+	3	4.0
Missing	1	1.3
Total	75	100.0

Table 7. Organisation size and breadth of operations

Number of employees	Breadth of operations				Total
	Local	Regional	National	International	
1–5	12	6	10	11	39
6–20	4	4	9	4	21
21–50	2		5		7
51–100	1		2		3
100+	1		1	1	3
Total	20	10	27	16	73

3.2. Univariate statistics

Table 2 summarises questions relating to the use of EC techniques and the intermediate effects of those uses. The number responding to each question, the mean response and standard deviation (SD) are given. The responses are anchored by 1 (has not helped us not at all) and 5 (has helped to a very large extent). For each question, the null hypothesis (that the EC technique had no effect at all) was

statistically tested and very strongly rejected (the smallest p value was 0.004). For example; the hypothesis that the web page had no effect in attracting new customers was very strongly rejected (t=12.747). E-mail, web pages and other aspects of the Internet are commonly used; Internet based EDI and FAQ pages are less frequent.

The most striking intermediate effects are e-mail's ability to help stay in touch with various parties (especially customers) and EDI enabling 'increased data transfer speed'. The latter reflects the ability to transfer instantly data such as orders or payments between firms.

The intermediate effects were factor analysed. Two nearly orthogonal factors explaining 31 and 13% of the total variance were obtained. The first factor was a general factor onto which all but one of the intermediate effects loaded significantly. The second factor was difficult to interpret: items pertaining to close contact with customers loaded strongly and positively onto it but items reflecting internal costs and processes loaded strongly negatively onto it. Factor analysis was not illuminating and was not pursued.

Table 3 summarises responses to questions on final effects. For each question, the null hypothesis (that e-commerce had no effect) was t-tested; all these hypotheses except that pertaining to short-term cost reduction (p=0.013) were very strongly rejected.

3.3. Relationships between final and intermediate effects

A research objective was to identify those intermediate effects (and EC components) that had a significant impact on the final effects (revenue, costs and competitive advantage in the short and long-term). The intermediate effects examined were those listed in column 3 of Table 2 except that the intermediate effects of using of FAQ pages and Internet EDI were excluded because there were too few responses for reliable statistical analysis.

Stepwise regression was used to identify statistical relationships between the intermediate and final effects of internet e-commerce. In principle, it would be desirable to regress each final variable against all intermediate variables. However, it was clear that the many missing values would mask any statistically significant results. Therefore, each final variable was regressed against each group of intermediate variables associated with an aspect of e-commerce (Table 2). Thus, six final variables were regressed against each of four groups of intermediate variables. Fifteen of these 24 cases yielded statistically significant (p<0.05) relationships. These significant relationships are summarised in Table 8. The method of entry was a combination of forward and backward procedures. The predictor was included if the probability of F-value to enter was less than or equal to 0.05, and excluded if the probability of F-value to be removed was greater than or equal to 0.1. Before the analyses were conducted, the assumptions underlying stepwise regression (Coakes and Steed, 1997) were tested, no serious violations being found.

Table 8. Statistical relationships between intermediate and final factors

Dependent variable	Number of observations	*R*-squared	*F*-statistic	Independent variable	Standardised coefficient	Significance
Short-term new revenue	43	0.120	5.754	Web page attracts more customers	0.415	0.021
Short-term new revenue	27	0.189	6.068	The web helps us reduce advertising cost	0.488	0.021
Long-term new revenue	59	0.183	12.955	Having a web page helps us attract new customers	0.557	0.001
Long-term new revenue	34	0.384	20.580	The web helps us reduce advertising cost	0.758	0.000
Long-term new revenue	51	0.211	14.636	E-mail helps us stay in touch with customers	0.578	0.000
Long-term new revenue	49	0.417	18.532	The Internet has helped us expand products/services	0.512	0.000
				The Internet has helped us enter overseas markets	0.316	0.019
Long-term costs	26	0.269	9.218	E-mail helps us stay in touch with employees	0.638	0.006
Long-term costs	25	0.485	10.829	The Internet has helped overseas competitors enter the Australian market	1.143	0.000
				The Internet has helped us identify alternative suppliers	0.614	0.031

Dependent variable	Number of observations	*R*-squared	*F*-statistic	Independent variable	Standardised coefficient	Significance
Short-term competitive advantage	45	0.088	4.237	Web pages have helped us expand local markets	0.431	0.045
Short-term competitive advantage	36	0.231	10.521	The Internet has helped overseas competitors enter the Australian market	−0.600	0.003
Long-term competitive advantage	50	0.099	5.386	Web pages have helped us expand local markets	0.40	0.025
Long-term competitive advantage	40	0.211	10.413	The Internet has helped us expand products/services	0.557	0.003

3.4. Significant relationships

We now consider whether the statistical associations found in the previous section and summarised in Table 8 are plausible and whether the findings are relevant to small businesses.

Short-term new revenue is associated with attracting new customers and reduced advertising costs; both these intermediate variables are associated with having a web page. A web page gives universal visibility (assuming customers using search engines are likely to find the page). Advertising on the web has a small fixed cost (the cost of establishing and maintaining the page) and zero marginal cost. Such advertising is likely to be seen by potential customers, being much better directed than media advertising.

Long-term new revenue is associated with attracting new customers; reduced advertising costs, staying in touch with customers, expanding the product and/or service range and entering overseas markets. All of these intermediate variables are associated with using the internet except that 'staying in touch with customers' was also associated with e-mail use. Web pages can provide actual and potential customers with relevant information on products, services, availability, delivery arrangements and prices. Customers can be encouraged to order by obtaining written answers to their common questions from FAQ pages. Web pages can capture information from and about potential customers. This information can be orders, demographic data augmenting a customer database and/or enquiries that may lead to orders. Customers' comments can uncover market gaps and suggest product improvements. E-mail is an appropriate and efficient way of communicating with customers.

Long-term costs are associated with staying in touch with employees (associated with using e-mail), entry of overseas competitors and identifying alternative suppliers (both with Internet use). This strong relationship (p=0.006) with 'staying in touch with employees by e-mail' is counter-intuitive (e-mail has very small marginal costs); perhaps respondents associated this with the cost of employees' PCs and laptops. The other two variables had the expected effects.

Short-term competitive advantage was associated with expansion of local markets and the entry of overseas competitors into Australian markets. The latter is implausible but may be explained by internet-competent firms profiting at the expense of incompetents or by the fact that, although foreign firms have web sites accessible in Australia, they are disadvantaged by higher delivery costs and longer delivery times. There may be cultural obstacles such as the use of imperial instead of metric measuring systems and reluctance to deal with web presences of which customers have never heard.

Long-term competitive advantage was associated with expansion of local markets (web pages) and expansion of the range of products and/or services offered (internet). This is plausible, a web page makes information on the firm's products available throughout Australia (and the world). Potential customers do not depend on conventional media or representatives for information. Web pages can facilitate customer and potential customer feedback on product and/or service design.

4. Conclusion and recommendations for further research

This study was based on statistical responses from small Australian enterprises that used various aspects of e-commerce. E-commerce has received much publicity perhaps because it is commonly assumed that it will dramatically change, even undermine, the way conventional, bricks and mortar business is done and because the associated stock market mania for stocks purportedly engaged in e-commerce has created many 'paper millionaires'. It is true that e-commerce will change business procedures: e-commerce can abolish geographic and time barriers to business; can accelerate business processes; facilitate changes in supply chain arrangements (accentuating competition and/or creating co-operation); improve communication with customers, suppliers and employees; create new promotional mechanisms and help create customer histories.

There is overwhelming statistical evidence that SMEs using e-commerce obtain intermediate benefits from it. There are strong statistical relationships between some intermediate benefits and final benefits (costs, revenues and competitive advantage in the

short- and long-run). Most of these relationships have plausible causal explanations. The lesson for Australian SMEs is clear; those using e-commerce techniques find them advantageous and there are obvious reasons for this.

Many aspects of e-commerce merit future research. In this study we have not differentiated between B2B and retail e-commerce. E-commerce will affect most firms' products and services, supply chains, geographic scope, customer relationships and internal structures. The most mundane and difficult aspect of e-commerce is fulfilment: the delivery of physical goods that have been ordered. Governments' possibly ineffectual efforts to regulate and tax the e-economy (for which national boundaries are irrelevant) merit study. The electronic market and fulfilment tend to have economies of scale, governments may have to intervene to prevent monopolies arising. The effect on consumers is of great interest; presumably they will benefit from systems that are more efficient and sensitive to their buying habits and intensified competition. They may be sensitive to the conflict between efficiency (everyone's medical history is stored and available in an emergency) and privacy.

Recommended articles

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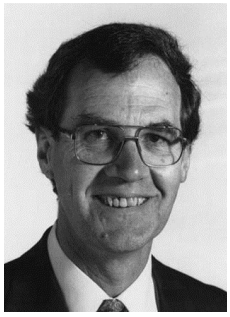

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