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PITFALLS OF ELECTRONIC COMMERCE IN LARGE CORPORATIONS

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Abstract

To enable businesses to maximise value and achieve benefits from electronic commerce, it is imperative to identify, analyse and overcome challenges that lie ahead those engaging in conducting the business electronically. The research presented in this paper reports on the pitfalls – challenges of electronic commerce encountered among the top 500 Australian publicly listed companies. The results showed that the most encountered challenges among large corporations include a lack of e-commerce knowledge, technology cost, acquiring IT skilled people, a lack of e-commerce infrastructure, security, as well as making the business known to users, customer service, budgetary constraints, etc. It has also been established that participating companies from the industries with the highest response rate to the questionnaire have encountered similar challenges in their paths of implementation of electronic commerce. However, despite the fact that the encountered challenges among participating companies were similar, the analysis have shown that different industries have experienced different impacts from the challenges they met.

Keywords: Electronic Commerce, Challenges, and Australia

1 INTRODUCTION

Australian organisations, like their international counterparts, are moving to adopt electronic commerce as part of their business strategy at an increasing rate. This research concentrates on well-established large organisations in Australia. Although electronic commerce is adopted by and is relevant to small businesses as well, this research only addresses electronic commerce challenges in the top 500 Australian companies identified from WWW.connect4.com.au. Despite the preponderance of small and medium enterprises in Australia, our research interest in large organisations was motivated by the fact that anecdotal evidence that suggests that electronic commerce is more prevalent in these organisations, but there exists little empirical evidence to support this. Furthermore, there have been few attempts to learn from the experiences of successful adopters so that those following may benefit from their experiences. In section 2 we provide an overview of EC challenges found in the literature then, in section 3 we introduce the research methodology. In section 4 we present the survey results and analysis undertaken. Section 5 contains conclusion and recommendations for further research.

2 BACKGROUND

A substantial reading was carried out to review the relevant literature relating to challenges of electronic commerce and to make sure that no important findings in this field are ignored (Sekaran, 1992). For the purpose of this paper, electronic commerce is defined as any transaction completed over computer mediated network that involves the transfer of ownership or rights to use goods or services (US Bureau of Census). The literature review provided the necessary background and basis for the survey questionnaire. It was also established from the literature that many Australian business leaders, compared to the leaders of other developed countries, appear to have adopted a 'wait and see' attitude towards the uptake of electronic commerce. As this paper is focused on pitfalls of electronic commerce the emphasis of the literature review was on electronic commerce challenges, with major findings presented in Table 1.

Challenges	Literature
Security	Rankin et al., 2000; Warrington et al, 2000; Koved et al, 2001; Phan, 2003
Software installation	Hoffman et al, 1999; 1999; Papazaferiopoulu et al., 2001.
Web site issues	Zhang et al., 2000; Lee, 2001; Chatterjee et al, 2002.
People and organisational issues	Corbitt, 2000; Feeny, 2000; Hughes, 2001; Arnott et al., 2002.
Measuring success	Hoffman et al, 1999; Abeyesekera et al, 1999.
Technology cost	Wenninger, 2000; Rahul et al, 2001.
Lack of EC infrastructure	Hoffman et al, 1999; Smits et al, 2002; McIvor, 2003.
Customer service	Alter, 1999; Hughes, 2001; Lee, 2001; Chan et al., 2003
Obtaining senior management support	Guariono et al., 1990; Feeny, 2000; Hughes, 2001; Debreceny et al, 2003.
Customers' old habits	Hoffman et al, 1999; Schwartz, 1999; Singh et al, 2002.
Legal issues	Lawrence et al, 2002; de Souza et al., 2000; Worthy, 2003.

Table 1.   Challenges of Electronic Commerce

In order to explore the electronic commerce issues identified from the literature in the field, among the organisations that use electronic commerce in their businesses, interviews (that are the topic of another paper) were conducted in seven well-established companies in Melbourne and Sydney. Almost a hundred Australian companies located in Melbourne and Sydney was invited to participate in the study. Seven agreed to be interviewed and it was decided to investigate these. The reasons to focus on

companies Melbourne and Sydney-based included the fact that majority of large corporations in Australia are based in those two cities, as well as that Melbourne is the researchers' residence.

The impact of interviews with senior managers in charge of electronic commerce in seven Australian companies on the survey of top 500 Australian companies was significant. Many of factors that were identified during the interviews were not identified in the literature review. However, all of the factors were included in the survey questionnaire, because they represented the real issues faced by the companies engaged in electronic commerce. Some of the factors identified from the literature had no support from the interviews but they were also included in the survey questionnaire. The reason for this was that the research sought to investigate the views of top 500 Australian companies about the issues that had been identified, regardless of the source of the information. Thus the final design of the questionnaire (available from the authors on request) comprised of 20 challenges.

3   RESEARCH METHODOLOGY

3.1   Research Questions

The research questions for this research were:
- What are the challenges of electronic commerce that inhibit its successful operation?
- What is the ability of Australian companies to anticipate the challenges of electronic commerce that lie ahead?
- Are the differences with regard to challenges facing organisations different on an industry-by-industry basis?
- To what extent on an industry-by-industry basis, are organisations underestimating or overestimating the challenges of electronic commerce?

3.2   Research Method

This research was accomplished via mail questionnaires sent to the top 500 Australian companies. The use of questionnaires is among the most widely used techniques for gathering data (De Vaus, 1990). This is also the case in the information systems field (Lawrence et al., 1993; Galliers, 1994; Rouse et al., 1995). The main advantage of a postal questionnaire is that it offers great anonymity (Kumar, 1996), and is suitable for vast geographical coverage (Sekaran, 1992). Furthermore, as suggested by Kumar (1996, p. 110), "if potential respondents are scattered over a wide geographical area, you have no choice but to use a questionnaire, as interviewing in these circumstances would be extremely expensive". Therefore, since this was a national survey, a postal questionnaire was considered the most appropriate for this part of the research.

Respondents were asked to indicate the anticipated and experienced impact of each of the challenges presented, by choosing one response for each item in both anticipated and encountered part of the question, on a Likert scale. The answers were on an ordinal Likert scale, ranged from 0 indicating no impact to 5 indicating the greatest impact. Likert scales are commonly used in business research in order to make valuable conclusions (Sekaran, 1992), because they allow participants to respond with degrees of agreement or disagreement (Kerlinger, 1986) or to indicate how they agree or disagree with a statement related to a certain issue (Zikmund, 1991). Likert and similar scales have been used by many researchers in information systems and other fields, such as Lawrence et al., (1993); Boynton et al. (1994); Blackwell (1995); Gearson et al. (1995), Revenaugh et al., (1997) and Kuzic et al., 2002.

Since the acquired data were measured on an ordinal scale, it was appropriate to perform non-parametric statistical tests (Siegel, 1988). Non-parametric tests are described as statistical procedures that use nominal or ordinal-scaled data (Zikmund, 1991; Kerlinger, 1986; Jordon, 1985). The advantages of non-parametric statistical tests are that they are capable of analysing the data inherently

in ranks and also of analysing data whose seemingly numerical scores have the strength of ranks (Siegel, 1988).

The compiled data from the survey were analysed using SPSS, a PC-based statistical packages in a Windows environment. In accordance with the collated data, appropriate statistical analyses such as the Sign test and the Kruskal-Wallis test were conducted.

The Sign test helped to gain an insight into the ability of the participating companies to estimate the magnitude of each of the challenges encountered. This test is often used on occasions such as "pre-test post-test" (Cramer, 1998) and "before and after study" (Siegel, 1988). Similar research with pre-adoption and post adoption examination had been undertaken in the information systems fields by authors such as Kaharana et al. (1999) and Kuzic, et al. (2002).

In order to determine the differences between enablers, inhibitors and benefits of electronic commerce among the four industries with the highest response rates and the entire sample, the Kruskal-Wallis test was performed. Because it allows analysis of more than two independent groups of ordinal data (Christensen et al., 1986) the Kruskal-Wallis test is generally conducted in order to find out whether the differences among the samples signify real population differences or the kind of variations to be expected from the same population. (Siegel, 1988).

3.3   Responses

The response rate for the survey was 21.96 %. A response rate of approximately 22% was considered acceptable, because mail data collection response rates typically fall between 5 and 10 percent (Alreck et al., 1985). Falconer et al., (1999) have cited Galliers, (1987) who reported the London School of Economics' opinion that a response rate of around 10% is the most one can expect from a large mail survey. Since the number of responses from some industries was quite low, in order to make the analysis more comprehensive, the following reclassification was established:

The responses by the industry sectors are presented in table 2.

Industry	Number responded	Percent
Finance/Banking	24	23.9%
Manufacturing	20	19.8%
Communications	12	11.9%
Wholesale and retail trade	11	10.9%
Other	34	33.5%
Total	101	100%

Table 2.   Responses by the Industry Sectors

In Table 2 "other" category includes industries with 5 or less responses. These include: property and business services, transport and storage, recreation and other services, international trade, agriculture, and forestry, construction, insurance, etc.

4   FINDINGS

The sign test that was conducted gave an indication about the abilities to anticipate challenges of electronic commerce before participating organisations in Australia. The results of the Sign test are presented in Table 3.

Challenges	Anticipated (Mean)	Encountered (Mean)	Sign test P- value
Budget	2.810526	3.010526	.791

Employee resistance towards e-commerce	2.336735	2.212766	.322
Measuring success	2.701031	2.736264	.617
Managing change	2.894737	3.064516	.082
Security	2.865979	2.831579	.677
Technology cost	3.103093	3.442105	.000
Web site issues	2.271739	2.406593	.291
Software compatibility	2.649485	2.734043	.030
Lack of e-commerce infrastructure	3.000000	3.010526	.210
Integrating front-end EC to back-end system	3.530612	3.483871	1.000
Lack of e-commerce knowledge	3.260417	3.427083	.001
Acquiring IT skilled people	2.876289	3.052632	.008
Reliable technology vendor	2.294737	2.655914	.005
Internet service provider reliability	2.083333	2.208333	.381
Obtaining senior managers support	2.810526	2.568421	.001
Current e-commerce legislation	1.736264	1.527473	.001
Dealing with intermediaries	2.322917	2.031915	.001
Customer service	2.697917	2.726316	.560
Making business known to users	2.635417	2.926316	.059
Reaching customers in rural and regional areas	1.454545	1.574713	.007

Table 3.   Sign Test for Challenges

The results of the Sign test suggest that in 9 out of the 20 challenges, the differences between their anticipated and encountered mean values were statistically significant. Significance here is a measure of the confidence that can be placed in a result that is not merely a matter of chance. A level of significance equal or less than the predetermined level allows us to conclude that the observed association in the sample "is not a result of chance deviation from independence in population but rather represents a genuine relation between the variables in population" (Siegel, 1988, p. 229).

Thus the results of the Sign test indicated that participating companies in general did not anticipate correctly the influence of nine challenges. However, it also indicated that in 11 out of the 20 challenges, the differences between their anticipated and encountered means were not statistically significant. This indicated that the surveyed companies had correctly anticipated 11 out of 20 electronic commerce challenges.

In order to establish the rank of the encountered challenges of electronic commerce in the sample of surveyed companies, number of responses and their medians were computed. A table containing a descending order of electronic commerce challenges is presented on the next page.

Rank	Challenges	Median	No of responses
1	Lack of e-commerce knowledge	3.0000	96
2	Technology cost	3.0000	95
2	Acquiring IT skilled people	3.0000	95
2	Lack of e-commerce infrastructure	3.0000	95
2	Security	3.0000	95
2	Making business known to users	3.0000	95
2	Customer service	3.0000	95
8	Budget	3.0000	94
8	Software compatibility	3.0000	94
10	Integrating front-end EC to back-end system	3.0000	93
10	Managing change	3.0000	93
10	Reliable technology vendor	3.0000	93
13	Measuring success	3.0000	91
14	Internet service provider reliability	2.0000	96
15	Obtaining senor managers support	2.0000	95

16	Employee resistance towards e-commerce	2.0000	94
16	Dealing with intermediaries	2.0000	94
18	Web site issues	2.0000	91
19	Reaching customers in rural/regional areas	2.0000	87
20	Current e-commerce legislation	1.0000	91

Table 4.   Rank Order for Challenges of Electronic Commerce

From the median values in the table above it can be concluded that although the vast majority of companies have encountered the majority of challenges, their median values do differ.

To find out if there is a difference between the ranking of inhibitors of electronic commerce, in the four industries with the highest response rate, and those in the entire sample, the same computations were undertaken. The analysis has shown that the vast majority of inhibitors in these industries have similar rankings to those in the entire sample. The summary table and the analysis are presented below.

	R	A	N	K	
Industry	1	2	3	4	5
Finance/ Banking	Technology cost	Lack of EC knowledge	Budget	Acquiring IT skilled people	Customer service
Manufactu-ring	Lack of EC knowledge	Technology cost	Lack of EC infrastructure	Making business known to users	Security
Communications	Lack of EC infrastructure	Managing change	Technology cost	Lack of EC knowledge	Acquiring IT skilled people
Wholesale/ Retail	Lack of EC knowledge	Security	Technology cost	Managing change	Acquiring IT skilled people

Table 5.   Top Five Challenges in Four Industries with the Highest Response Rate

If we compare the top five challenges for the four industries, with the top 5 challenges for the entire sample we can see the following:
- 60% of the top five challenges for the Finance/Banking industry are represented in the top 5 challenges for the entire sample.
- 80% of the top five challenges for the Manufacturing industry are represented in the top 5 challenges for the entire sample.
- 80% of the top five challenges for the Communication industry are represented in the top 5 as well.
- 80% of the top five challenges for the Wholesale and Retail industry are represented in the top 5 challenges for the entire sample.

It can be seen from this comparison that the highest ranked challenges in the four industries cited are very similarly ranked in the entire population. The reason for this could be that all the participants are at the same stage of electronic commerce and are therefore faced with similar challenges.

Not all of the participants in electronic commerce should expect to encounter all of the challenges. It will depend on many factors such as the size of the organisation, the environment in which the company operates, the industry it is in, etc.

In order to find out to what extent the industries with the highest response rate underestimated or overestimated the challenges of electronic commerce, the mean for anticipated and encountered challenges for each industry were computed, and results are presented in the table below.

Challenges	Finance/Banking		Manufacturing		Communications		Wholesale/Retail	
	Ant. mean	Enc. mean	Ant. mean	Enc. mean	Antic. mean	Enc. mean	Antic. mean	Enc. mean
Budget	2.4783	2.9583	3.0500	2.8421	3.1000	2.9091	2.5556	2.8889

Resistance to EC	2.6667	2.2174	2.1000	2.1579	2.1000	1.6667	2.7273	2.4444
Measuring success	2.6250	2.8261	2.6500	2.5263	2.5000	2.4000	3.2727	3.4444
Managing change	2.7500	3.0000	3.2000	2.8421	2.7000	3.0833	3.2222	3.5556
Security	2.4348	2.4167	2.9500	2.9474	2.6000	2.1667	3.5455	4.1111
Technology cost	2.8261	3.2083	3.5500	3.4737	2.5000	3.0000	3.5455	4.0000
Web site issues	2.0455	2.1304	2.6316	2.6667	2.1000	2.0000	2.7778	2.8750
Compatible Software	2.0000	2.1667	2.9500	2.9444	2.1000	2.0833	2.9091	3.4444
Lack of EC infrastructure	2.8636	2.7391	3.2500	3.2105	3.4000	3.1667	2.7000	3.0000
Integrating front-end to back-end system	3.0435	2.8750	3.5500	3.3333	3.5455	3.3636	3.4545	3.4444
Lack of EC knowledge	2.9130	3.0000	3.4000	3.6316	3.0000	2.9167	3.5000	3.7000
Acquiring IT skilled people	2.4783	2.7083	2.9500	3.0000	2.4000	2.8333	3.2727	3.5556
Reliable technology vendor	2.3043	2.5833	2.3684	2.8889	1.9000	2.4167	3.0000	3.1250
Internet service provider reliability	2.0870	2.2500	2.2500	2.6842	1.9000	1.8333	2.5000	2.8000
Obtaining senor managers support	2.7391	2.4583	2.6000	2.2632	2.9000	2.2500	3.1000	2.8000
Current EC legislation	1.6957	1.5833	1.5294	1.2500	1.7000	1.5833	2.3333	1.7778
Dealing with intermediaries	2.3478	1.9167	2.2500	2.2105	2.4444	2.0909	2.3636	2.1111
Customer service	2.6087	2.5417	2.6000	2.8947	2.3000	2.3333	3.0000	3.3333
Making business known to users	2.6522	2.6667	2.5000	3.1579	2.0000	2.5000	2.8000	3.2222
Reaching customers in rural/regional areas	1.5455	1.483	1.7778	2.1176	1.4000	1.4167	1.6667	2.0000

Table 6.   *Challenges of Electronic Commerce (anticipated and encountered) in Four Industries with the Highest Response Rate*

From Table 6 the following could be concluded:
- The Finance/Banking industry underestimated the magnitude of 11 challenges (mean values shaded). The same industry overestimated the magnitude of 9 challenges.
- The Manufacturing industry underestimated the magnitude of 9 challenges (mean values shaded). The same industry overestimated the magnitude of 11 challenges.
- The Communications industry underestimated the magnitude of 6 challenges (mean values shaded). The same industry overestimated the magnitude of 14 challenges.
- The Wholesale/Retail industry underestimated the magnitude of 15 challenges (mean values shaded). The same industry overestimated the magnitude of 5 challenges

To further the analysis and to find out whether the differences between inhibitors of electronic commerce across the four industries with the highest response rate are *statistically significant,* Kruskal-Wallis tests were performed. The results of Kruskal-Wallis test for challenges of electronic commerce from the four industries are presented below.

Challenges	Fin./Bank. (Significance)	Manufacturing (Significance)	Communications (Significance)	W/ R Trade (Significance)
Budget	.232	.206	.039	.638
Employee resistance towards e-commerce	.494	.545	.632	.317
Measuring success	.578	.671	.989	.327

Managing change	.827	.853	.878	.480
Security	.876	.724	.325	.317
Technology cost	.672	.192	.392	.317
Web site issues	.189	.352	.607	.318
Software compatibility	.687	.600	.223	.371
Lack of EC infrastructure	.904	.667	.386	.337
Integrating front-end EC to back-end system	.268	.510	.369	.318
Lack of e-business knowledge	.455	.123	.392	.368
Acquiring IT skilled people	.689	.206	.325	.219
Reliable technology vendor	.294	.216	.392	.317
Internet service provider reliability	.195	.962	.259	.221
Obtaining senor managers support	.192	.478	.392	.368
Current EC legislation	.633	.695	.223	.338
Dealing with intermediaries	.568	.352	.223	.317
Customer service	.209	.687	.371	.328
Making business known to users	.613	.580	.223	.342
Reaching customers in rural/regional areas	.506	.733	.564	.452

Table 6.   Kruskal Wallis Test for Challenges

The results from the table above suggested that almost all of the variations in the industries when compared with each other were of the kind to be expected among the samples from the same population. The only difference however that was suggested to be statistically significant was 'budget' as a challenge in the communications industry (shaded). The reason for it to be less of a challenge in this industry than in another was not identified from this research.

Major findings from the analysis presented in this paper are:
- The response rate from top 500 Australian companies was satisfactory.
- The highest response rates were from finance/banking, manufacturing, communications and wholesale/retail industries
- A majority of companies encountered a number of common challenges of electronic commerce.
- The most encountered challenges among large corporations include lack of e-commerce knowledge, technology cost, acquiring IT skilled people, lack of e-commerce infrastructure, security, as well as making business known to users, customer service, budget, etc.
- Australian companies correctly estimated the magnitude of the majority of challenges of electronic commerce that lay ahead (11 out of 20). However, the participants did not correctly estimated certain portion of the challenges (9 out of 20).
- The highest ranked challenges in the four industries cited are very similarly ranked in the entire population.
- The four industries had slightly different number of underestimated, as well as overestimated challenges. This seems to suggest that the focus of different industries is on slightly different issues.
- Challenges of integrating front-end EC to back-end system, obtaining senior managers support, current EC legislation, and dealing with intermediaries were overestimated by the respondents from

all 4 industries. This indicated that companies in those industries did not have much of a problem regarding these issues as they expected it.

- Challenges of acquiring IT skilled people and reliable technology vendor were underestimated by the respondents from all 4 industries. This indicated that companies from those industries had more problems regarding these issues in particular than they expected it.

5   CONCLUSION AND FURTHER RESEARCH

As electronic commerce expands, many organisations around the world and Australia will endeavour to engage in this new way of doing business. Most of them will achieve this in the foreseeable future. However, those that stand the best chance of being successful are the ones that have a thorough knowledge of the pitfalls of electronic commerce and the solutions for them.

It is evident from this research that the majority of participating companies encountered a number of common challenges of electronic commerce, as well as that the most encountered challenges included lack of e-commerce knowledge, technology cost, acquiring IT skilled people, lack of e-commerce infrastructure, security, as well as making business known to users, customer service, budget, etc. It is also evident that Australian companies have the ability to foresee the majority of challenges of electronic commerce that lay ahead, although the focus of different industries is on slightly different issues.

Even though this research focused on Australia's large corporations, because the nature of electronic commerce is global, the findings from this research should also be applicable to businesses over a much wider scope. Finally, although this research addresses well-established business enterprises in Australia, similar research into small and medium-sized businesses could generate different findings of interest. Finally, further research into the pitfalls of electronic commerce in some of the neighbouring countries is recommended to identify possible similarities/differences in challenges as well as solutions for them.

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