Edith Cowan University

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ELECTRONIC MARKETPLACES

The number of electronic marketplaces currently trading on the Internet is estimated to be between 800 to 1000 (Hurwitz, 2000). They cover every type of good and service and vary in size, content, structure and organisation. The rapid increase in the number of e-marketplaces is expected to end with a period of stringent consolidation resulting in less than 200 marketplaces remaining within the next two to three years (Forrester Research, 2000). In the current climate of proliferation there are few barriers to entry and membership of multiple marketplaces is still common as companies seek to find the most appropriate platform for their needs. Choosing an exchange can be 'as simple as selecting where to order lunch or as complex as selecting a spouse' (Morgenthal, 2001) depending on the level of service a company is seeking. To benefit from the complete array of services offered, a company will require specific software and integration with legacy systems. This will lead to a greater commitment to selected marketplaces and require confidence that those marketplaces can survive the consolidation period and provide the anticipated benefits.

Electronic marketplaces offer three levels of service (Choudhury et al., 1998):

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Services offered</th>
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<tbody>
<tr>
<td>Identification</td>
<td>Identification of possible buyers/suppliers to facilitate a choice and enable the transaction to take place. Particularly useful for goods and services that are difficult to source or where speed is a vital element.</td>
</tr>
<tr>
<td>Selection</td>
<td>Identification of possible buyers/suppliers and selection of the most appropriate one. Includes the use of auctions which are often used to source direct materials</td>
</tr>
<tr>
<td>Execution</td>
<td>Once selection has been made, financial and logistical services are available to complete execution of the transaction. This type of marketplace often offers further value-add services including industry information, design collaboration etc..</td>
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</table>

Table 1: Levels of service offered by e-marketplaces

Companies are moving towards electronic marketplaces in a piecemeal way. Some are trying multiple membership, while others are locked into one marketplace either through choice or to follow the direction of a major supplier/buyer. If these marketplaces are to flourish and bring real benefits to industry they need to attract and maintain a critical mass of participants. This requires a clearer knowledge of the prospective benefits and how to acquire them on the part of buyers and suppliers. There is extensive anecdotal reporting of the benefits in the business press, but it is difficult for companies to be sure of the source and validity of these reports.

In this confusing environment there is a need for a systematic look at how the electronic marketplaces can contribute real value to a company. An evaluation of benefits which is grounded in Information Systems theory and then mapped against the benefits espoused by the business press would give an impartial, but practical starting point on which companies could begin plans to maximise the use of electronic marketplaces.

RESEARCH AND METHODOLOGY

There is a substantial body of literature in the IS discipline regarding the evaluation of Information Systems and it is this literature that forms the basis for the evaluation in this study. However, the nature of this evaluation is problematic in regard to electronic marketplaces which are not necessarily definable as IS. This study, therefore initially considers the use and adaptability of IS evaluation methods and their relevance to electronic marketplaces.

http://ro.ecu.edu.au/ecuworks/6760
Evaluation of IS benefits

The evaluation of benefits in IS has been the subject of much debate. How to measure benefits and define effectiveness is a difficult question and one that has provoked a number of studies over the years. Earlier evaluations placed more emphasis on the technical issues involved in IS (Serafeimidis & Smithson, 1994) and transaction uses and neglected the ‘ultimate success dimension’ of organisational benefits (Mirani & Lederer, 1998). Hirschheim and Smithson (1988) argue that the treatment of IS evaluation as a technical problem leads to meaningless conclusions as it does not assess the impact on users’ jobs and social environment. As the discipline of IS matured and IS systems became more pervasive and complex, the need for methods of evaluation which appreciated the intangible, defined by Kaplan (1986) as ‘revenue enhancements’, as well as tangible outcomes was recognised and the use of more interpretive evaluation methods has developed. (Mirani & Lederer, 1998, Hirschheim & Smithson, 1988, Serafeimidis & Smithson, 1994, DeLone & McLean, 1992). These interpretative methods require an understanding of the nature and purpose of the evaluation and the social context and process if they are to be effective(Walsham, 1993).

Recognisable tools are required to carry out these evaluations in order to maintain clarity and transparency in the evaluation and to allow for a cumulative tradition of comparative studies to be made. Despite the elements of uniqueness in the installation and use of Information Systems there remain similarities in the benefits to be gained. It is therefore reasonable that measurement tools can be developed and adapted to fit individual IS. The classic study by DeLone and McLean (1992) examined many of the earlier studies carried out in the discipline and condensed them into six categories. These categories address the different areas of evaluation that can be studied, but are also inter-related and inter-dependent.

![DeLone and McLean's IS Success Model](image)

Figure 1: DeLone and McLean’s IS Success Model

Several studies address one or more of these categories and models have been developed to progress research in IS evaluation (Bailey & Pearson, 1983; Ives, Olson, & Baroudi, 1983; Lucas, 1981; Mirani & Lederer, 1998; Srinivasan, 1985). However, although DeLone and McLean did not collate the list of MIS success factors to be used as a model, this study uses it to identify where the major benefits of electronic marketplaces lie. This will establish a starting point for the ongoing evaluations, based on empirical evidence, that will be required as electronic marketplaces continue to develop, consolidate and mature.
Electronic Marketplaces as Information Systems

There are difficulties in measuring and evaluating the benefits of e-marketplaces according to models developed for Information Systems, where installation, training and use follows a more recognisable pattern. E-marketplaces vary considerably according to the type of industries they are addressing, the services they are offering and the nature of their ownership. Companies do not ‘install’ an e-marketplace, but participate at a chosen level through the Internet. Participation may require substantial commitment including licensing fees and integration of legacy systems for more complex sites such as Covisint (http://www.covisint.com) or simply require access to the Internet for less complex sites like Cargofinder (http://www.cargofinder.com).

The different levels of service offered by the varying e-marketplaces contribute a considerable range of benefits. At the most basic level of identification of a new supplier, where the major benefits relate directly to cost savings, evaluation by cost-benefit analysis may be feasible. Even here there are difficulties as although costs are easy to identify and quantify they do not provide a comprehensive picture of the hidden true costs (Hirschheim & Smithson, 1988). However, the more complex markets, such as those being developed by industry consortia, offer a greater range of services which, in many cases, are moving towards substantial contributions of information to meet both tactical and strategic planning requirements. At this level, the marketplaces are recognisably Information Systems and the evaluation tools developed for IS have relevance.

Methodology

A body of available business literature was analysed to accumulate a list of benefits regarded as prevalent in electronic marketplaces. The business literature consisted of both online sources (e-zines, electronic periodicals and journals, and business research reports) and offline sources such as business periodicals, newspapers and computer magazines. A list of benefits from approximately 150 articles was collated and consolidated to remove duplicates.

Given the fluid nature of e-marketplaces where failures, mergers and newcomers contribute to an unstable arena, no attempt was made to sort benefits on an individual market basis or to categorise the types of e-marketplace. The list of benefits made was mapped against Delone and McLean’s success measures, according to the six categories (Table 2), to evaluate where the benefits lie. This establishes a broad starting point from which the identified benefits can be continuously evaluated, through empirical studies, as marketplaces mature.

The benefits discussed in this article are collated from subjective sources and therefore include some less tangible benefits which relate to the various stakeholders involved in the use of an electronic marketplace. For example, ‘enjoyable’ and ‘easy to use’ are not identifiably company benefits except in relation to the motivation to use the technology which enhances the work flow. In this respect the interpretation of some of the benefits by the researchers becomes part of the interpretive nature of the research (Walsham, 1993).
Table 2 shows the list of benefits gathered from the business press categorised according to DeLone and McLean.

<table>
<thead>
<tr>
<th>System quality</th>
<th>Information quality</th>
<th>Information use</th>
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<tbody>
<tr>
<td>Ease of use</td>
<td>Current</td>
<td>Purpose of use</td>
</tr>
<tr>
<td>Convenience of access</td>
<td>Timely</td>
<td>Recurring use</td>
</tr>
<tr>
<td>System flexibility</td>
<td>Reliable</td>
<td>Motivation to use</td>
</tr>
<tr>
<td>Usefulness of features and functions</td>
<td>Useable</td>
<td></td>
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<tr>
<td>Response time</td>
<td>Complete</td>
<td></td>
</tr>
<tr>
<td>Integration of systems</td>
<td>Accurate</td>
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<tr>
<td></td>
<td>Free from bias</td>
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<tr>
<th>User satisfaction</th>
<th>Individual impact</th>
<th>Organisational impact</th>
</tr>
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<tbody>
<tr>
<td>Overall satisfaction</td>
<td>Problem identification, information awareness and decision effectiveness through provision of: Analytical capabilities for business analysis Market intelligence Forecasting Greater visibility of supply chain Project management collaboration Information sharing Interorganisation connections Instant communications Mediated business processes</td>
<td>Operating cost reductions: Reduced transaction costs Controlled spending Cheaper prices Savings on logistics Savings on collaboration Savings on design Reduced marketing costs Lower inventory carrying costs For smaller companies by aggregation Overall productivity gains: Overall time savings Process efficiencies Better inventory management Shortens product time to market Staff reductions Increased sales by: reaching new markets reaching more buyers/suppliers global exposure Contribution to achieving goals through improved management of data and ‘near perfect’ information flow Increased work volume by improving efficiency of information flows and collaborative working practices Service effectiveness: customer relations management loyalty building optimising relationships</td>
</tr>
</tbody>
</table>

Table 2: Benefits of Electronic Marketplaces Categorised under MIS Success Measures
DISCUSSION

The mapping of cited e-marketplace benefits into each category indicates that there is scope for a wide variety of measurements to be used in ongoing evaluations. In selecting the measurement tools it is necessary to consider the reason for the evaluation and the nature and context of the organisation requiring the evaluation (Walsham, 1993). The categories are inter-related and need to be considered against each other. For example system quality has perhaps become a less accurate measure of an Information System as hardware and software reliability has improved and familiarity with technologies like the Internet become very widespread. It is, however, closely related to the most commonly used success measure, user satisfaction (Bailey & Pearson, 1983; DeLone & McLean, 1992) which is also described as a surrogate method for ‘the unmeasurable result of changes in organisational effectiveness’ (Ives et al., 1983). The user satisfaction approach takes into account both the users’ satisfaction with the system and with the information received from it, which in the case of e-marketplaces includes decision making satisfaction.

Information is the most frequently cited benefit of many e-marketplaces and the quality of the information is of great importance. The cited benefits under this category were concerned with the delivery of timely, reliable, up to date information that was accurate and complete. If e-marketplaces can live up to their boasts of information quality, and guarantee freedom from bias, then there are two areas of benefits: Firstly, information relating to operational considerations such as extension of markets and supply chain issues. Secondly, at senior management levels where the strategic and tactical contributions have the potential to be very superior and to bring extensive benefits to participants.

Information use, as opposed to quality, is a difficult category to assess without specific empirical research as it measures the amount of use a system has as an indicator of its success within a company. The nature of the use of the e-marketplace will depend on the facilities on offer and whether the user is conducting transactions (thereby obtaining the best price for the product or service in question) or finding information for other purposes. Business reports suggest that the uses of information from e-marketplaces will be far-reaching which indicates that the motivation for frequent use will be strong.

Several of the benefits described in the business press could be mapped against success measures found in the individual impact category. These benefits relate to the range of information and levels of collaboration that the e-marketplaces can offer through their value-add facilities rather than supply chain transactions. If these benefits can be realised the potential for supporting decision making and strategic planning at upper management and executive level is enormous. This is a facet of electronic marketplaces that promises much but is yet to prove deliverable.

The list of benefits indicates that the full impact of electronic marketplaces will fall within organisational benefits. Again, if they are realisable then the implications for a shift in emphasis from a supply chain tool to a management tool are considerable. Previous studies have used some measures of organisational impact as an indication of IS effectiveness (Ein-Dor, Segev, & Steinfeld, 1981; Jurison, 1996) but it is interesting to note that the anticipated benefits of e-marketplaces meet all the measures listed by DeLone and McLean. These benefits must be repeatedly measured and evaluated against the needs of an organisation both to ensure that the benefits exist and that the organisation is realising them (Ward, Taylor, & Bond, 1996). This is an area that is of particular importance to practitioners in an era of rapid change and intense competition where speed in decision making and strategic planning is required to meet the challenges.
IMPLICATIONS FOR IS BENEFITS EVALUATION

Although the benefits of e-marketplaces may appear to map quite neatly onto the Delone and McLean framework, this exercise has highlighted a number of implications for IS benefits evaluation research:

User Satisfaction

The frameworks constructed in the early to mid 1990s provide an internal focus on the benefits of IS. User satisfaction has frequently been cited as a key benefit for most systems as discussed above. However, the users in studies of this nature were mostly employees of the organisation, whereas today customers are often the ‘real’ users of Web based applications. Their involvement and participation in design and development and their general satisfaction with the completed systems are frequently overlooked. In relation to e-marketplaces however, user satisfaction could be expected to be relatively low in importance. The adoption of e-marketplaces is a strategic move for an organisation and one that goes beyond the satisfaction of users. E-marketplaces are a business model facilitated by technology and the decision to adopt e-marketplace trading would be dictated by major organisational issues.

Organisational Benefits

Organisational benefits have more recently been cited as the driving force behind Information Systems with strategic underpinnings. Few studies have investigated the use of Information Systems as strategic drivers, and their role in creating options for the future and new market alliances. So why are organisations participating in e-marketplaces? Some may rationalise decisions in terms of convenience, cost savings etc., but for many large organisations it may well be that they simply cannot afford to be left out. In other words, e-marketplaces are rapidly becoming the entry level business model for procurement. In the mining industry for example, all the major players including Alcoa, BHP, and WMC are simultaneously partners and competitors in a major mining industry e-marketplace, Quadrem (http://www.quadrem.com). It is difficult for one company to opt out when it would potentially be disastrous not to be associated with such leading edge developments in the industry. Companies must balance the need for participation at any cost against the costs involved. We argue that IS benefits evaluation has looked for rational benefits which are often the easiest to see when in reality fear and creating new market alliances maybe behind companies participation in e-marketplaces. For these reasons research into the organisational benefits of IS needs to be revisited.

Static View

Reasons for adopting technologies and their perceived benefits change through time. Most IS benefits evaluation research takes a rather static view of benefits. When business models are rapidly evolving, e-marketplaces being a good example, the benefits also change rapidly.

Process of Evaluation

It is clear that the process of evaluation can influence the outcomes in terms of the benefits obtained. If an organisation can see immediate savings through using e-marketplaces then it may ignore the need to analyse the costs associated with the model (including such time-intensive tasks as putting bids together).

We suggest that IS benefits can only be examined by considering three aspects:

IS benefits evaluation (including organisational strategic benefits)

Longitudinal evaluation

The process of evaluation
Our current research projects are investigating e-marketplaces in the mining industry using these three facets of evaluation as a basic model.

CONCLUSION

Electronic marketplaces are one of the new technologies that are driving changes not only in operational processes, but also in decision making and strategic planning methods. Despite the relative immaturity of the marketplaces they are offering a wide range of benefits in many areas of commerce. The identified benefits lie mainly in the categories of individual and organisational impact; categories of IS success measures which have been recognised as important areas requiring more rigorous evaluation through empirical studies.

However, while the argument has been made that e-marketplaces could be evaluated using tools developed for IS evaluation, the results indicate that such evaluations are inadequate. The potential uses of the information facilities that are being, and will be, offered by electronic marketplaces go beyond the measures available in benefit evaluation tools examined in this article. Effective evaluation must build on these tools to include assessment of strategic benefits which may affect not only organisational, but also industry, structures. Additionally, the process of evaluation is becoming an important element in the study of benefits evaluation as many reasons for participating in new technologies appear to be based on unarticulated intangibles, which need to be identified. Lastly, given the immaturity and the speed of development of electronic marketplaces, empirical studies in this area should take a longitudinal approach to the task of evaluation to enable a more accurate view of the benefits to be gained from this dynamic environment.

REFERENCES


Developing an E-commerce Best Practice Model for Victorian Wineries: An Agenda for Research

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ABSTRACT

This paper describes a framework for researching the adoption of e-commerce by Victorian wineries. The proposed framework constitutes the initial stage of ongoing research into wineries and how the Internet can be used to deliver advantages in this internationally recognised export sector. The research incorporates aspects of Roger's diffusion of innovation model, recommends the use of OECD e-commerce performance indicators as a means of assessing wineries for e-commerce readiness, intensity and impact. Expected outcomes are the identification of how wineries are successfully using e-commerce and the synthesis of a best practice model based on the analysis of case studies and surveys.

Keywords: Electronic commerce, Victorian wine cluster, OECD e-commerce indicators, Internet diffusion, adopters and non-adopters.

INTRODUCTION

Internet-based transactions are growing rapidly worldwide, although at varying rates in different countries (OECD 2000b). During the 1980's and early 1990's, Electronic Data Interchange (EDI) was widely accepted as the electronic business technology of choice that was used by organisations for information exchange. The drawback was that EDI was proprietary and expensive, hence generally only available to large businesses. The advent of the Internet has removed these impediments and the adoption of e-commerce by small businesses has occurred in the last five years. Electronic commerce is a new business paradigm increasingly used by organisations around the world to capitalise on the potential of new technologies such as the Internet and the World Wide Web. Consequently, e-commerce can create considerable opportunities allowing firms to expand their customer base, rationalise their business and enter new markets (OECD 2000b; Porter 2001).

Various definitions of e-commerce have been suggested. E-commerce has been defined as:
‘the buying and selling of goods on the Internet’ (ATO 1997: p12).

‘the use of computers and electronic networks to conduct business over the Internet or other electronic network’ (PriceWaterHouseCoopers 1999: p4).

‘encompassing all commercial transaction activities’ (Groves and da Rin 1999: p2).

‘the buying and selling, marketing and servicing, and delivery and payment of products, services and information over the Internet, intranets, extranets and other networks between an enterprise and its customers, suppliers and other business partners’ (O'Brien 1999: p344)
The Organisation for Economic and Co-operative Development (OECD) argues that to be able to determine how e-commerce is used and what impacts occur from its use, an effective and uniform definition of e-commerce is necessary. The OECD, in consultation with member working groups, has linked the definition of on-line e-commerce to the Internet transaction, and consequently broadly defines Internet e-commerce as:

‘the sale or purchase of goods, the exchange of information, whether between businesses, households, individuals, government, and other public or private organisations, conducted over the Internet’ (OECD 2000c: p2).

For the purpose of this study, the OECD definition will be used as a simple definition of Internet based e-commerce (IEC).

AUSTRALIAN AND VICTORIAN WINE: A BACKGROUND

The Australian wine industry has undergone a renaissance over the last twenty years. Australian winegrowers and the wine industry can be regarded as having global best practice in wine making and viticulture (Anderson 2000; Hardie 2000).

The last five years has been extremely successful for the industry with wine exports contributing some $1.6 billion to the national economy to the end of August, 2000. In 1995, a comprehensive analysis of the entire wine industry was undertaken and coordinated by the Australian Wine Foundation, leading to the development of the industry’s 30-year plan—Strategy 2025. Strategy 2025 provided a broad national blueprint for progress toward the target of $4.5 billion in annual sales by 2025 by being the world’s most influential and profitable supplier of branded wines, pioneering wine as a universal first choice lifestyle beverage (Hoj and Hayes 1998; Hardie 2000; Marsh and Shaw 2000).

Since 1998 the grape crush has increased some twelve fold, whilst in the same period the number of wineries has increased by 350—many of these new wineries being small in size. The industry structure is such that the top three wine groups (Southcorp, BRL Hardy & Beringer Blass) account for some 75% of the wine export value (the top 10 have 85% of the value). Consequently, small wineries, which have an annual grape crush of less than 1000 tonnes, comprise a substantial proportion of all winemaking businesses in this country. When compared to other states of Australia, a greater proportion of Victorian wineries are classified as being small to boutique (n=336) Victorian wineries can thus be classified as small to medium (SME) size rural businesses, which collectively interact with a cluster of specific industry suppliers (n=708), wine organisations (n=167) and industry distributors (n=154) (ANZWD 2000; VWTC 2000). The interaction of Victorian wineries with the general wine industry is depicted in figure one.
SMALL TO MEDIUM SIZE BUSINESSES AND THE INTERNET

A number of Australian studies have been conducted examining the use of information technology and the Internet in Small to Medium Enterprise (SME) (Poon and Swatman 1997; Burgess 2000; NOIE 2000). The most prominent of these has been a regular study of the use of IT in small businesses conducted by Pacific Access for Yellow Pages Australia with Telstra (Pacific Access 2000). More recently the National Office for Information Economy has released a report-card on the use of the web and e-commerce by business (NOIE 2000). These studies provide valuable statistics in relation to computer usage and electronic commerce in relation to an organisation's size, which is broken down into general industry areas. They do not attempt, however, to examine the underlying reasons as to how, why and when small businesses use these technologies, for example, their strategic motivations for using e-commerce. No studies focus or detail specific industries to identify the leading users (innovators, early adopters) of the Internet within that industry. Many studies take a snap shot at a particular instance in time and report findings (eg Pacific Access study). Little, if any literature exists on specific Australian rural firms detailing and describing the adoption and use of the Internet or e-commerce. A general study on farm use of the Internet (n=27 participants) has been undertaken by Groves and da Rin (2000). Some case studies (n=22) that relate to rural e-commerce in Australia have been described by Papandreou and Wade (2000), and e-commerce use by the beef industry (n=22 businesses) has been reported by Gregor and Jones (1999). Internet marketing (n=60 participants) in South Australian vineyards has been investigated by Goodman (1999), however, little effort has been undertaken to explain, document and map specific groups (adopters through to laggards) or explain some of the supply chain effects (if any) within the wine industry.

Numerous studies, after generalised investigations into the use of e-commerce by business, conclude by calling for industry specific research to expand the understanding and literature base on e-commerce use by specific industry sectors (Parao and Campbell 1998; PriceWaterHouseCoopers, 1999; NOIE 2000; OECD 2000a; OECD 2000b).
RATIONALE FOR THE RESEARCH

E-commerce adoption and the wine industry

The Wine Industry 30-year blueprint (Strategy 2025) does not mention issues associated with interactive technologies such as e-commerce or Internet use/adoptions. This may have been an oversight at the time (1995) when the use of the Internet was still in its embryonic stage. The pressures for the adoption of e-commerce by agribusiness will increase worldwide (Gregor and Jones 1999; Badger 2000; Rowley 2000), and the wine industry will not be isolated from this trend. Industry leaders such as Southcorp, Miranda and Tyrrells have planned, or are anticipating, the move to electronic business by utilising the Internet as the central technology with new supply chain management and enterprise resource planning systems. These large businesses have concluded that earnings growth in the future will not only be tied to the revenue from the phenomenal export growth to date, but to efficiency and cost management strategies—these strategies being inextricably tied to the electronic streamlining of supply chains and customising business processes (Braue 2001).

Some wine industry literature on e-commerce and the use of the Internet exists (Goldman and Armstrong 1999; Goodman 2000; Horlin-Smith 2000), however, there are no specifics on issues associated with direct selling to consumers (B2C), dealings that wineries have with government, especially for document exchange, or the way that wineries may purchase on-line from their suppliers (B2B). At this point in time, the industry appears to have been slow to adopt e-commerce for competitive advantage, when compared to other Australian sectors (Major 2000). Adoption of the Internet will benefit areas such as grape-growing, winemaking, administration and marketing, warehousing and distribution (Horlin-Smith 2000). E-commerce has the potential to streamline information flows and transactions between constituent entities within the supply chain, resulting in cost savings and shorter delivery times. For the very small wineries a direct interaction with customers may allow for the by-passing of certain elements in the supply chain (e.g. wine distributors, agents and retailers), potentially leading to cost reductions and increased market penetration.

Consequently, in a global economy, within an industry that will undoubtedly encounter fierce competition from the traditional wine producing countries (Italy, France and Spain), the need for successful adoption of best practice commerce, be it electronic or otherwise becomes a strategic necessity. Within the Victorian wine industry, where the majority of firms are small, best practice in e-commerce can overcome some of the numerous disadvantages of being small and remote. This will enhance the financial health of the winery business, the Australian wine industry in general and the Victorian State economy.

RESEARCH INVESTIGATION, OUTCOMES AND THEORETICAL FRAMEWORK

The research will examine the use of e-commerce within Victorian small wineries in order to identify the adopters (innovators and early adopters) and non-adopters (laggards or resistors) on the basis of Roger’s Diffusion Theory paradigm. Barriers to the use of e-commerce will be determined to identify the areas that the industry needs to address so as to facilitate an increased rate of uptake of this process. The benefits from the successful use of e-commerce will also be identified and from this a model will be developed for the most effective use of e-commerce within the industry.

The suggested outcomes of the study include:

The identification of the adopters and non-adopters of e-commerce within the industry.

The determination of pertinent business attitudes and actions (management strategy) of the adopters. Specific questions to be addressed:

To what degree of complexity have these businesses adopted e-commerce (this may range from simple e-mail & web promotion to full e-commerce transactional facilities with consumers and suppliers)?
What problems were encountered in establishing an e-commerce strategy?
What resources were required and which were most important in establishing e-commerce?
Can specific indicators for wineries be identified for measuring success of an e-commerce venture?

The determination of barriers to adoption. Analysis of business attitudes and actions of non-adopters will provide a profile of areas that need to be addressed to overcome resistance to e-commerce use.

The formulation of a robust model that reflects best practice in the use of e-commerce within wineries. The model will be developed from the collation of data and case study information detailing measures for successful and effective use of e-commerce within Victorian small wineries.

THEORETICAL FRAMEWORK

Diffusion Theory

Within the realms of innovation research the dominant paradigm is that of innovation diffusion. Innovation diffusion has had considerable success in describing how innovations move, or diffuse, through large populations either to be adopted or to be rejected. Roger's diffusion of innovation model is a well documented and consistently researched framework applied across many disciplines. Innovation diffusion is based on the notion that adoption of an innovation involves the spontaneous or planned spread of new ideas. Rogers defines an innovation as:

"...an idea, a practice, or object that is perceived as new by an individual or another unit" (Rogers 1995:p11).

The successful diffusion of an innovation follows the S-shaped rate of adoption, a curve that fits a normal distribution. The cumulative S-shaped rate of adoption curve is depicted in figure 2 showing the relationship between the adopters and late-adopters over a period of time. The four main elements of diffusion as proposed by Rogers, and which have been identified in all diffusion research studies, are the innovation itself, the communication channels for disseminating information on the innovation, a time period and the social system that adopts the innovation. Hence, diffusion is a process by which an innovation is communicated through certain channels over time amongst the members of a social group. The social group for the purpose of this study will be the members or individuals who operate Victorian wineries and the innovation will be deemed to be Internet based e-commerce.

![Figure 2: The innovation diffusion process over time](Adopted form Rogers, 1995:11).

Initially, the innovation is used by the early adopters and the curve is reasonably flat. However, as more members of the group adopt the innovation the curve "takes off". As the late adopters start to use the innovation, a saturation point is eventually reached indicating the innovation has diffused through the population.

As mentioned the S-shaped diffusion curve follows a normal distribution. Rogers breaks the normal distribution curve into five sections (figure 3) — each section representing a particular group of the community that adopts the innovation, each group having peculiar characteristics, behaviours and social conditioning. Briefly, Roger's proposed adoption/diffusion continuum recognises five categories of participants:

The innovators who tend to be first users of a new idea and constitute the first 2.5% of individuals in a system
The early adopters who may be technically sophisticated and interested in the innovation for solving business problems and gaining competitive advantage

The early majority who are pragmatists and constitute the first part of the mainstream when it comes to the adoption of the innovation

The late majority who are less comfortable with technology and are the sceptical second half of the mainstream

The laggards or 'resistors' who may never adopt the innovation

Because the Internet is new to many businesses, wineries being no exception, it is unlikely that sufficient adoption of the Internet will have occurred to be able to use this five category classification. Rogers (1995) alludes to this difficulty of classification, pointing out that it occurs when an innovation hasn't achieved 100 percent use. He suggests that this problem can be overcome by combining the innovation groups, to form a composite class. Consequently, the proposed study will use two categories to classify the members of the study system—those that are using the Internet/e-commerce (adopters) and those not using this new innovation (non-adopters).

MEASURING E-COMMERCE

The measurement of e-commerce has been problematical with different countries having their own methods and metrics. The OECD has proposed an e-commerce measurement framework with definitions and indicators by which it hopes will address the inconsistencies that currently prevail. The framework has the support of member countries, interested parties and researchers, and identifies three stages of the e-commerce life-cycle—stages that can be related to cumulative S-shaped adoption-diffusion curve (figure 4). Each stage has a group of indicators that will reflect most appropriately the success or otherwise of e-commerce use, thus enabling comparisons across countries, sectors or industries. As the use of e-commerce matures, interest will not be so much on e-commerce growth, but how it contributes in adding value and creating wealth for the businesses that utilise it. Hence, the measure of e-commerce requires 'qualitative' measures as one traverses the life cycle (Simpson 1999; Colecchia 2000).
The three stages of the e-commerce maturity are related to readiness of adoption, intensity of use of e-commerce and the impacts of e-commerce. A brief summary of the three stages follows:

E-commerce readiness: This constitutes the initial stages of adoption. There should be an attempt to identify the enabling factors and the barriers to e-commerce adoption. Readiness measures have received the greatest attention so far. Two categories of indicators have been developed: the first relates to the availability of the telecommunications infrastructure, whilst the second addresses the skills and training issues associated with e-commerce.

E-commerce intensity: As the rate of adoption of e-commerce accelerates, the focus of investigations shifts to the degree and frequency (intensity) of e-commerce use to enable policy makers to address imbalances. These issues investigated relate to the state of e-commerce usage, volume, value and nature of the transactions. Intensity measures are important in identification of who is exploiting e-commerce possibilities and who is not, and to identify leading users (pro-active businesses).

E-commerce impact: As adoption becomes widespread, the focus of investigations addresses how e-commerce has impacted on the social group and cluster participants. Measuring the impact of e-commerce on the economy and society becomes important. Investigations address the characteristics associated with 'value added' and 'multiplier' effects of e-commerce—have there been effects beyond substitution, with the creation of new wealth or knowledge (value added). Key measures need to evaluate whether and to what extent e-commerce makes some kind of difference in terms of efficiency and/or the creation of new sources of wealth. Figure 4 depicts the adoption-diffusion S-curve and the e-commerce maturity stages.

![Figure 4: S-curve rate of innovation adoption with the levels of e-commerce activity](image)

Each stage of maturity will require different indicators to measure readiness, intensity and impacts of e-commerce.

As part of the OECD efforts in developing a measurement framework, a set of core performance indicators have been identified that address the measurement of the e-commerce stages of readiness, intensity and impact. These core performance indicators will be used as a reference for the research study. The OECD indicators have been developed in conjunction with member countries, the wider international community and the various e-commerce stakeholders (Simpson 1999; Colecchia 2000; OECD 2000c; personal communication with Colecchia, April 2001).
RESEARCH METHODOLOGY AND DESIGN

There are three areas of data collection that can be identified in undertaking the proposed study.

Identification of adopters and non-adopters of the Internet

Examination of wine industry records going back to the early 1980's constitutes the main source of time series and historical data. Winery records have been compiled by the industry from statistics and data supplied by the Australian Bureau of Statistics, the Australian Wine and Brandy Corporation, and the wineries themselves. The records contain data on all relevant aspects of wineries ranging from their geographical location, export activities and a comprehensive listing of contact information—they are referred to as the 'bible' by industry participants. Since 1995, the business contact information for wineries commenced with the inclusion of email addresses and web site URL, which ostensibly identifies the wineries that are using the tools that enable them to undertake e-commerce (adopters of e-commerce tools). The directories also identify the wineries that have no on-line presence, and it can be assumed that they are not using the Internet for business purposes (non-adopters of e-commerce tools).

Identification of barriers to the use of the Internet

Survey questionnaires will be used to gather data from the non-adopters on the specific issues relating to barriers they have encountered in their attempts to use the Internet for business purposes (Why aren't you on-line yet?).

Case studies and data collection to identify best practice for the use of the Internet/e-commerce

A survey questionnaire will be used to collect data and information from the wineries that use the Internet (adopters) as part of their normal business practice. Information on business attitudes and actions, and the level of e-commerce complexity, will be gained at this data gathering stage. Wineries that wish to participate in case studies will be identified. The collected case studies will be analysed and used to formulate an e-commerce best practice model for Victorian wineries. The proposed methodology is depicted in figure 5.

Methodology Roadmap

![Methodology Roadmap](image)

Figure 5: Research methodology roadmap indicating relationships between data and information sources, outcomes of adopter and non-adopter data collection and strategy for best practice development (model synthesis).

CONCLUSION

This proposal establishes a basic framework and direction for discovering and exploring the use of the Internet and e-commerce in Victorian wineries. The research outcomes will not only add to the general e-commerce knowledge literature, but also to the understanding and practice of e-commerce in an important export sector. The research design is such, that there are four measurable outcomes at different stages of the project. Each
outcome constitutes a form of knowledge discovery—which can be immediately published if desired. Immediate publication effectively allows the research to be evaluated by peers, so as to solicit review, comments, approval and critiques of the new contributions. The synthesis of a best-practice model will form a template for wineries to use, to either establish and/or enhance their e-commerce business processes and practices.

REFERENCES


Measuring Costs/Benefits of E-business Applications and Customer Satisfaction

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ABSTRACT

Businesses need to measure the costs and benefits associated with an E-business application. As E-business applications are connecting directly to two critical business constituencies: customer and employee, customer satisfaction has become a criterion to measure the application success. This paper described a research project that identifies cost and benefit factors of E-business applications and explores the correlation between customer satisfaction and relevant cost/benefit factors. The research is based on two respective surveys: customer oriented and business oriented.

Keywords: Electronic businesses, Electronic commerce, Assessment, Customer satisfaction

INTRODUCTION

Over the last few years the Internet has evolved from being a scientific network only, to a platform that is enabling a new generation of businesses—electronic businesses (E-businesses). E-business provides the convenience, availability and world-wide reach of Internet to enhance existing businesses or create new virtual businesses (Amor 1999). The E-banking, E-auctioning and E-directories are all the successful E-businesses. The question is no longer why or whether a business should develop their E-business or when, but rather how to do so most effectively (Cho 1999). Making E-business applications assessment can help answer this urgent question.

Before adopting an E-business application, organizations need to assess its real business values and benefits, and to compare its costs with those of the associated investment. The intangible and multi-criteria nature of most E-business costs and benefits makes it difficult to assess an actual business case. There have been numerous attempts documented in the literature that assessed online application development and involved identifying benefits for E-business applications (see, Ng et al. 1998, Cho1999, Giaglis et al. 1999, Trepper 2000). Some guidelines for broad categories regarding costs/benefits of E-business applications were given (Buchanan and Lukaszewski 1997). These include cost reduction, revenue growth, improved customer satisfaction and quality improvements. However, above research didn’t come up with a straightforward model to quantify the cost/benefits of an E-business investment. The majority of above research focused on evaluation of the advantages and strengths of E-business with a number of measurement criteria from the business viewpoint.

As E-business applications are connecting directly to customers, customer satisfaction becomes one of the most important measures to E-business success. An increased awareness of the importance of customer satisfaction issues has prompted the research community to explore customer satisfaction measurement (Kurniawan 2000). Some measurement approaches and relevant results have been reported (Cho 1999). Generally three types of customer satisfaction measurement were used: the relative importance of attributes, dimension of customer satisfaction and added customer value.
'Attribute importance' means every service attribute contributes diversely to the overall satisfaction of the customer. 'Dimension of customer satisfaction' means every dimension of satisfaction gets its own score, which then can be compared to evaluate the strengths and weaknesses of the applications. 'Added customer value' is generated through dividing the business' overall customer satisfaction by the scores of all businesses competing in a certain market (Amor 1999).

However, very little research exists today for assessing E-business applications from both the business and its customer points of view simultaneously. Particularly, there is a lack in the study of correlation between customer satisfaction and relevant cost/benefit factors. This research uses the cost and benefit as two measurements from company point of view, and customer satisfaction as a measurement from the customer point of view to assess E-business applications. This research identifies main cost/benefit factors and presents a set of results describing the relationships between cost/benefit factors and customer satisfaction. The results are based on two respective surveys conducted in New Zealand: customer oriented and business (E-business supplier) oriented. The surveys focused on the E-business applications in small and medium businesses.

Following the research (Lu et al. 2001, Lu 2001), this paper describes the research method of this project in Section 2. Section 3 examines customer satisfaction with E-business applications. Section 4 identifies main cost factors of E-business applications and explores the relationships between these cost factors and customer satisfaction. Section 5 investigates main benefit factors and the relationships between these benefit factors and customer satisfaction. Findings and conclusions are presented in Section 6.

RESEARCH METHODS AND DESIGN

At the highest level an E-business application success means it achieves at least one of the two objectives: to reduce operating costs (bottom line) - by reaching existing business partners, customers, and channels more effectively and efficiently; and to increase revenues (top line) - by reaching new customers and new channels with new products and services (Cho 1999). In order to assess E-business success from both business and customer sides this project produced two respective surveys: customer oriented and business (E-business supplier) oriented.

The first survey intended finding which companies had developed E-business applications, and potential customers' assessment for the sample of companies. It was an exploratory desk survey that gathered data about the customer satisfaction with E-business applications. Customers were asked to search business Web sites and fill in a survey. A total of 156 company Web sites were searched and assessed by a customer group from June 20 to September 20, 2000. The 156 companies were randomly selected from 149,974 organizations registered in the UBD E-directory at http://www.ubd.co.nz conditional on reaching an appropriate level of E-business development. The sample of companies consists of several industry sectors: Accommodation, Community services, Computing & technology, Education, Finance, Real estate, Retail, Transport & Storage, and Travel.

The second survey made use of a questionnaire in order to gather data about costs and benefits of E-business applications. A pre-test survey enabled the initial questionnaire to be refined. The final questionnaire was posted to the 156 sample companies mentioned above in October 2000. The respondents were asked to answer questions on a seven-point Likert discrete scale, or given a statement that they were free to choose 'yes' or 'no'. Out of the 44 items in the questionnaire, 17 were related to the costs of setting up and maintaining E-business applications and 21 were related to business benefits. A total of 56 responses were obtained with the analysis of this paper based on 45 completed questionnaires. In order to obtain related perceptions and detail not mentioned in the questionnaire, interviews were conducted with 5 selected businesses from the sample companies.
MEASURING CUSTOMER SATISFACTION WITH E-BUSINESS APPLICATIONS

Customer satisfaction is commonly acknowledged as the most useful measurement of E-business application success. Customer satisfaction is not easily measurable and hard to verify or quantify. The study measures the customer satisfaction for E-business applications using the first type of Amor (1999) measurement by utilizing a five-point Likert scale (Ng, Pan & Wilson 1998). A summary of the survey results is presented on the bottom line of Table 1. Of 45 companies, about 13% of E-business applications were marked ‘very satisfactory’, 40% marked ‘satisfactory’, and 29% ‘just satisfactory’.

Businesses turn to E-business for different reasons and had different measures for their applications success. About 73% of sample businesses indicated ‘customer satisfaction’ was one of the main measuring criteria for applications success, 44% took ‘number of new customers’ as a main measure, 36% used ‘business partner satisfaction’, and 29% indicated ‘cost of promoting products’ (Lu 2001). This result shows that many E-business applications were focusing on customer services, and prioritised customer satisfaction.

Although most businesses marked ‘customer satisfaction’ as one of main measures to E-business application success, do these companies have identical views with their customers on the assessment of a successful application? The question ‘what do you think of the E-business applications in your organization’ was included in the questionnaire with a three-point scale, in order to discover the difference between E-business suppliers’ and their customers’ assessment. There were 27% of businesses that were very satisfied with their applications, 56% with satisfactory, and 17% not satisfied (column 3, Table 1). In supplier ‘very satisfactory’ category, 12 (27%) companies were very satisfied with their E-business application, but only 25% of customers were very satisfied, and 33% were satisfied. However, a regression analysis between the extent of customer satisfaction and supplier satisfaction was also produced. The result proved that EC suppliers and their customers, basically, have an identical assessment for EC applications.

Table 1: Customer satisfaction and supplier satisfaction

<table>
<thead>
<tr>
<th>Supplier satisfaction</th>
<th>No (%)</th>
<th>Customer satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Very satisfactory</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Very satisfaction</td>
<td>12</td>
<td>27</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>25</td>
<td>56</td>
</tr>
<tr>
<td>Not satisfaction</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>100</td>
</tr>
</tbody>
</table>

CUSTOMER SATISFACTION AND COSTS FACTORS OF E-BUSINESS APPLICATIONS

There are a number of item related costs that can be considered. The cost section of the questionnaire asked companies to indicate their costs assessment with each of the cost statements (cost factors) on a seven-point Likert scale (the cost items and assessment results are listed in Table 2), ‘1’ means very low cost and ‘7’ very high. Together these 17 cost items have a strong internal consistency.
Of the sample companies, 9% did think that 'the cost of setting up E-businesses' (factor 1) was very high ('7') in their businesses, 16% did think higher ('6'), 23% marked '5'. The mean value of the item assessment is 3.68 and the variance is 3.74. Table 2 shows that the expenses of monitoring site use, legal issues, and shipping costs are held lower than other cost items, by contrast, rapid technology changes (factor 11) are considered as a highest cost factor. The item 'lack of skilled personnel' (factor 17) has the highest variance of all.

Table 2: Assessment and the weights for E-business application cost factors

<table>
<thead>
<tr>
<th>No</th>
<th>Cost factors</th>
<th>Percentage of companies on the cost factors (%)</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 2 3 4 5 6 7 N A Mean Variance Mean</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Expense of setting up E-business</td>
<td>9 1 6 2 3 1 8 1 1 7 9 7</td>
<td>3.68</td>
</tr>
<tr>
<td>2</td>
<td>Expense of maintaining E-business</td>
<td>14 1 8 2 5 2 7 7 2 4</td>
<td>3.21</td>
</tr>
<tr>
<td>3</td>
<td>Internet connection</td>
<td>5 2 7 3 6 1 7 1 4 5 7 0</td>
<td>3.41</td>
</tr>
<tr>
<td>4</td>
<td>Hardware/software</td>
<td>5 1 1 1 3 9 6 1 7 2 2</td>
<td>3.81</td>
</tr>
<tr>
<td>5</td>
<td>Monitoring site use</td>
<td>27 2 3 1 8 1 6 5 0 2 9</td>
<td>2.53</td>
</tr>
<tr>
<td>6</td>
<td>Security concerns</td>
<td>14 1 4 1 8 1 2 7 1 5 2 2</td>
<td>3.48</td>
</tr>
<tr>
<td>7</td>
<td>Legal issues</td>
<td>27 1 8 1 4 1 8 7 5 5 5 6</td>
<td>2.95</td>
</tr>
<tr>
<td>8</td>
<td>Training</td>
<td>16 1 4 1 8 3 6 7 5 0 4</td>
<td>3.20</td>
</tr>
<tr>
<td>9</td>
<td>EC expertise and personnel acquisition</td>
<td>5 2 0 1 4 1 1 1 1 4 1 1 5 13</td>
<td>3.79</td>
</tr>
<tr>
<td>10</td>
<td>Reliable search engines acquisition</td>
<td>11 1 6 1 6 2 0 1 4 7 2 14</td>
<td>3.45</td>
</tr>
<tr>
<td>11</td>
<td>Rapid technology changes</td>
<td>5 7 2 0 2 1 5 1 1 4 2 11</td>
<td>4.01</td>
</tr>
<tr>
<td>12</td>
<td>Shipping costs</td>
<td>20 1 8 9 7 7 2 7 7 30</td>
<td>3.03</td>
</tr>
<tr>
<td>13</td>
<td>Personnel requirement and recruitment</td>
<td>14 9 1 1 1 6 1 2 2 35</td>
<td>3.23</td>
</tr>
<tr>
<td>14</td>
<td>Costs of obtaining information about customers</td>
<td>11 7 2 7 7 9 5 2 32</td>
<td>3.28</td>
</tr>
<tr>
<td>15</td>
<td>Time spent on E-business development</td>
<td>5 1 6 2 1 3 6 9 9 7 15</td>
<td>3.74</td>
</tr>
<tr>
<td>16</td>
<td>Time spent on E-business maintenance</td>
<td>7 2 3 2 1 6 5 7 0 15</td>
<td>3.12</td>
</tr>
<tr>
<td>17</td>
<td>Lack of skilled personnel</td>
<td>7 1 1 6 1 6 4 9 7 5 31</td>
<td>3.70</td>
</tr>
</tbody>
</table>

In order to explore the relationships between customer satisfaction and cost items a set of hypotheses were designed and evaluated using the analysis of variance (ANOVA) approach. For example: H1: there are significant differences with regard to the time spent on E-business maintenance for the groups with different degree of customer satisfaction (more hypotheses will be discussed in another paper). Here, 'customer satisfaction' is defined as an independent variable with five levels, and 'time spent maintenance' as a dependent variable with seven levels. A one factor fixed effects ANOVA model (Hughes & Grawoig 1971) was used to determine the effect of the independent variables on the dependent measures in individuals (1), where, $\alpha$ represents the effect on dependent variable 'time_spent t_maintenance' under different degrees of 'customer satisfaction'.
The ANOVA results shown on Table 3 indicate that time spent maintenance is significantly different among the different groups of customer satisfaction ($p<0.05$). This means an application which received a high customer satisfaction usually required more time spent on maintenance. The result supports H1.

**Table 3: ANOVA results with cell means for the effects on ‘time spent on E-business maintenance (16)’**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Count</th>
<th>Average</th>
<th>Variance</th>
<th>Source of Variation</th>
<th>F</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very satisfaction</td>
<td>6</td>
<td>4.16667</td>
<td>0.566667</td>
<td>Between Groups</td>
<td>4.17889</td>
<td>0.007179</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>17</td>
<td>3.823529</td>
<td>2.029412</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Just satisfaction</td>
<td>10</td>
<td>2.5</td>
<td>1.166667</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less satisfaction</td>
<td>1</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not satisfaction</td>
<td>6</td>
<td>2</td>
<td>1.6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The respondents also were asked to indicate the degree of importance for each of the cost factors on a seven-point Likert scale, '1' means not important at all and '7' very important. The mean values are shown in the last column of Table 2. Eight items are identified as the core costs factors which were marked with a higher weight: expense of setting up E-business, maintaining E-business, internet connection, hardware/software, monitoring site use, reliable search engines acquisition, and rapid technology changes.

**CUSTOMER SATISFACTION AND BENEFIT FACTORS OF E-BUSINESS APPLICATIONS**

A total of 21 benefit items were taken into consideration in the survey (Table 4). The respondents were asked to indicate their present benefits assessment (1-low benefit, 7-very high benefit) and the ideal rating (1-not important, 7-very important) for each of the benefit factors. The benefit assessment is to investigate the status of respondents' current E-business provision, compared with where they would ideally like it to be. For example, if a company considers that currently the benefits of E-businesses allows it to access a larger market (let's say at a national rather than a regional level), but it would ideally prefer to access a Pacific or global level. Then it would score perhaps '3' on the present benefit assessment and a '6' on the ideal rating. However, each business typically has its own unique requirements and may have to develop other measures to analyze the benefits that are likely to come as a result applied E-businesses. Companies have different needs, competence and motivation, which affect their assessment.

The mean values of ideal rating for the benefit factors are shown on the last column of Table 4. Eight factors are identified as the core factors of benefit, which received a higher weight from the sample companies: access to a greater customer base, broadening market reach, lowering of entry barrier to new markets and cost of acquiring new customers, alternative communication channel to customers, increasing services to customers, enhancing perceived company image, gaining competitive advantages, and potential for increasing customer knowledge. Based on Table 4 a set of correlation analysis between the ‘customer satisfaction’ and each benefit factor was made using Pearson’s correlation coefficients. Items would be retained if the significance level of correlation with the customer satisfaction were less than 0.05. As many businesses' E-business applications focus on customer service, the results reported were same as expected. Almost all benefit factors were significantly corrected with customer satisfaction. The detail is discussed in another paper.
<table>
<thead>
<tr>
<th>No</th>
<th>Benefit factors</th>
<th>Percentage of companies on the present benefit assessment (%)</th>
<th>Ideal rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 2 3 4 5 6 7 N/A Mean Variance Mean</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Access to a greater customer base</td>
<td>1 1 1 1 8 1 1 8 1 1 1 1 3 1 1 12 4.31 4.46 5.82</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Broadening market reach</td>
<td>1 1 1 1 6 1 1 6 1 1 1 1 8 1 1 9 4.51 4.62 5.93</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Lowering of entry barrier to new markets and cost of acquiring new customers</td>
<td>0 2 1 1 0 1 1 1 1 1 1 1 8 1 1 18 4.27 5.25 5.53</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Global presence</td>
<td>2 0 9 7 1 1 6 4 1 1 22 3.58 5.75 4.43</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Reducing information dissemination costs</td>
<td>2 9 3 1 1 1 8 4 9 1 3 6 3 9 7 13 3.60 4.31 5.00</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Reducing advertising media costs</td>
<td>1 3 3 1 1 8 1 6 1 7 1 7 1 1 11 3.93 3.61 5.49</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Reducing operation (transaction) costs</td>
<td>9 1 1 1 8 1 3 9 4 2 27 3.21 3.87 4.97</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Reducing transaction time</td>
<td>9 1 1 1 6 1 1 9 7 4 33 3.48 4.95 5.00</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Reducing delivery time</td>
<td>1 3 1 9 9 4 7 7 40 3.48 5.42 4.62</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Alternative communication channel to customers</td>
<td>9 4 1 2 9 1 3 1 9 1 3 6 9 4.35 4.67 5.95</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Customer and market research facility</td>
<td>7 1 1 1 8 1 6 1 7 1 1 17 3.92 5.04 5.50</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Increasing services to customers</td>
<td>0 1 1 1 8 1 3 1 1 1 1 1 1 11 4.24 4.40 5.77</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Improving supplier relationships quality</td>
<td>9 1 1 1 1 1 1 1 9 9 27 3.89 5.77 5.06</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Enhancing perceived company image</td>
<td>0 1 1 1 3 1 6 1 1 1 3 2 0 7 4.70 4.19 6.29</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Organization learning and experiencing</td>
<td>7 7 2 1 9 8 1 1 4 4 13 3.70 3.67 5.16</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>More accurate data for business partners</td>
<td>9 7 1 2 4 1 3 7 7 22 3.95 4.97 5.21</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Catching up and keeping in line with trends</td>
<td>4 4 2 1 0 1 6 1 1 1 1 18 4.38 5.15 5.49</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Realizing business strategies</td>
<td>4 2 1 0 1 6 1 1 1 6 1 1 9 6 3.97 3.81 5.37</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Leveraging business performance</td>
<td>7 1 2 2 1 8 2 9 1 3 1 3 1 2 20 3.55 4.3 5.14</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Gaining &amp; sustaining competitive advantages</td>
<td>7 1 1 1 6 8 1 4 1 6 6 7 16 3.98 5.2 5.53</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Potential for increasing customer knowledge via interaction</td>
<td>4 9 2 1 8 1 1 8 1 1 3 4 12 3.89 3.66 5.85</td>
<td></td>
</tr>
</tbody>
</table>
Similar with cost factors analysis, a set of hypotheses about the relationships between benefits and customer satisfaction were designed and tested. One of the hypotheses is ‘the customer satisfaction is significantly dependent on "gaining competitive advantages"'. Here, 'Customer satisfaction' is defined as a dependent variable, and 'gain_competitive_advantages' as an independent variable, a one factor ANOVA model is shown in (2):

\[
\text{[customer satisfaction]}_{ij} = \alpha_i + [\text{gain_competitive_advantages}]_i + \varepsilon_i \quad (2)
\]

The results (Table 5) indicate that customer satisfaction is significantly dependent on 'gaining competitive advantages' (p<0.05).

Table 5: ANOVA results with cell means for the effects on customer satisfaction

<table>
<thead>
<tr>
<th>Groups</th>
<th>Count</th>
<th>Average</th>
<th>Variance</th>
<th>Source of Variation</th>
<th>F</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaining &amp; sustaining competitive advantages</td>
<td>3</td>
<td>3.666667</td>
<td>1.333333</td>
<td>Between Groups</td>
<td>2.429397</td>
<td>0.044857</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>3.5</td>
<td>1.428571</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>2.625</td>
<td>0.839286</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>2.857143</td>
<td>1.47619</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>7</td>
<td>2.285714</td>
<td>0.571429</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>2.142857</td>
<td>0.809524</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>1.666667</td>
<td>0.333333</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reducing costs is generally considered as one of the most important benefits being brought about by Internet technology. They can be achieved at a minimal investment to the organizations. For example, by shifting the majority of their functions online, organizations can reap tremendous savings in facilities and capital expenditure. However, relevant items (factor 5, 6, 7) were not given an obviously high weight from the sample companies. Enhancing perceived company image (factor 14) received a highest weight.

These benefit factors have a strong internal correlation. For example, E-business applications that can automate the business process would result in better communication (factor 10) and reduce the service costs of the organization (factor 5, 6, 7). Similarly, online product buying/selling would improve the service to the customers/suppliers (factor 12, 13) and result in better communication and streamline the corresponding business processes.

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FINDINGS AND CONCLUSIONS

Electronic commerce is about building better relationships among customer, producers, and suppliers. Traditional information systems are applied primarily to internal employees, E-business applications are connecting directly to critical business constituencies: customers, employees and business partners via Intranets, Extranets, and the Web. Therefore customer satisfaction has become a criterion to measure E-business application success. E-business suppliers have been aware that while an E-business application can be technically successful and meets its financial objectives, it can still be considered a failure if their customers are unhappy with the result.

The results show that the benefits factors of E-business applications are significantly correlated with customer satisfaction and the judgment on the quality of service has been shifted from the business to the individual customer. So the communication with customers becomes more important for businesses and needs to be refined (Amor 1999). In order to improve customer satisfaction, customer-centric E-business marketing strategy should be developed. For example, business can identify their customers in order to understand the buying patterns for every single customer and offer their customers automated assistance by pre-selecting goods, information and services that may be valuable to a particular customer. Today, customers have many means of communicating with a certain company. The customer information needs to be brought together into a database of customer profiles. It will support the company focus on the customer relationships.

The results also clearly indicate that improving customer satisfaction will make it easier and better to do business. A business needs to view their online applications from the customer point of view. Much like other IS applications the first step in determining success measurements for an E-business application is to define the application’s requirements and expectations. Some companies in the sample didn’t obtain ‘very satisfied’ response from customers due to ill-defined requirements that did not meet the expectations of customers. Therefore it is necessary for businesses to get enough feedback of customer experiences to clearly define their expectations and requirements. This includes a design of the appropriate online experience for its customers and to know better the needs of its customers. This will prepare a business for two diverse sets of E-businesses success: internal users and customers.

This research explores E-business application assessment from two sides: the businesses and customers, and discusses the relationships between cost/benefit factors and customer satisfaction. The results can be applied to plan quality improvements and launch E-business applications to assist in obtaining insights on the real costs/benefits of E-business investment for small and medium business. Particularly, it can be used to companies that already implemented E-business solutions but want to evaluate their applications.

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Use of the Web for Destination Marketing in Regional Tourism

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ABSTRACT

The information-intensive nature of the tourism industry suggests an important role for Web technology in the promotion and marketing of destinations. This paper evaluates the level of Web site development in New Zealand’s Regional Tourism Organisations, and compares them to their Australian counterparts. The study uses the extended Model of Internet Commerce Adoption (Burgess and Cooper 2000), and highlights the utility of using interactivity to evaluate the relative maturity of commercial Web sites.

Keywords: Electronic commerce adoption, Tourism, Destination marketing

INTRODUCTION

Conventional wisdom contends that business Web site development typically begins simply and evolves over time with the addition of features as the site takes on more functionality and complexity (e.g. MED 2000). Past empirical research of commercial web sites support this notion, contending that firms imitate what others do on the Web, partially in a desire to keep pace with competitors or to gain an advantage over competitors in ones own industry by replicating what firms have done in other industries (Sumner and Klepper 1998), or build expertise in electronic commerce through progressive experience with Internet technologies (Poon and Swatman 1999, VanSlyke 2000). Academic enquiry into this evolutionary process followed by firms is gaining momentum, and a number of benchmarking studies have evaluated the extent of Web site development in particular industry sectors of New Zealand (e.g. Rachman and Richins 1997, Smith 2001).

This paper reports the results of a study of Web site development in New Zealand’s tourism industry. Tourism is an unusual product, in that it does not exist when it is purchased. Tourism exists only as information at the point of sale, and cannot be sampled before the purchase decision is made (WTO Business Council 1999). The information-based nature of this product means that the Internet, which offers global reach and multimedia capability, is an increasingly important means of promoting and distributing tourism services (cf. Walle 1996).
The Internet is a potentially significant means of promotion and destination marketing for New Zealand's tourism industry. New Zealand's top four markets for international visitors are Australia, UK, USA and Japan (Tourism Strategy Group 2001). The latter three, together with Germany (another important market for New Zealand), are the top tourism spenders in the world and also account for about 80% of the world's Internet users (WTO Business Council 1999). No wonder that New Zealand's "Tourism Strategy 2010" suggests that tourism should be able to secure significant lifts in performance through the application of technology such as the Internet. The document identifies Web sites as a way of in destination branding and marketing: "Consistent and reliable web information is an important part of attracting visitors and meeting their expectations" (Tourism Strategy Group 2001: 53).

Tourism is one of New Zealand's most important industries in terms of economic contribution. An $11.5 billion industry, it is responsible for 1 in 10 jobs and is the country's largest export earner. Within the industry there are a small number of publicly listed companies and an estimated 18,000 small to medium enterprises (SMEs), about 80% of which employ less than 5 people (Tourism Strategy Group 2001). The tourism industry provides a wide variety of products and services, including adventure tourism, culture and heritage, transport, accommodation, retail and hospitality. Regional destination marketing organisations called Regional Tourism Organisations (RTOs) form part of the industry structure, and it is these organisations that are the focus of the current study. RTOs form an important layer between central government and the local tourism industry, potentially providing a coordinated and comprehensive marketing effort, and acting as a portal for visitor access to tourism operators and service providers.

The purpose of this study is to evaluate the extent of Web site development in New Zealand's RTOs. This evaluation is achieved using an Internet commerce adoption metric developed by Burgess and Cooper (2000) in a study of the Australian regional tourism industry, the extended Model of Internet Commerce Adoption (eMICA). The Web sites of 26 New Zealand RTOs were evaluated using the eMICA model. Secondary objectives of the study were (1) evaluating the validity of the extended MICA as proposed in the Australian study in a different national context, and (2) contributing to a comparative study across the two countries.

The structure of the paper is as follows. First the eMICA model used in the study is described. Next, the role of RTOs in the New Zealand tourism industry is discussed, and the results of the study are reported. A discussion of the results and the importance of Web site interactivity are then followed by some concluding remarks.

**THE EXTENDED MODEL OF INTERNET COMMERCE ADOPTION**

The Model of Internet Commerce Adoption (MICA) was originally developed for a study in the Australian metal fabrication industry (Burgess and Cooper 1998). The model proposes that in developing commercial web sites, organisations typically start simply by establishing a presence on the Web and build on functionality over time, as their expertise in the use of Internet technologies increases. In addition, as Web sites build on complexity, so will the number of modules incorporated into the site increase. MICA consists of three stages, incorporating three levels of business process – Web-based promotion, provision of information and services, and transaction processing. The three levels of business processes are similar to those proposed by Ho (1997) and Liu et al. (1997). The stages of development provide a roadmap that indicates where a business or industry sector is in its development of Internet commerce applications.

As sites move through the stages of development from inception (promotion) through consolidation (provision) to maturity (processing), layers of complexity and functionality are added to the site. This addition of layers is synonymous with the business moving from a static Internet presence through increasing levels of interactivity to a dynamic site incorporating value chain integration and innovative applications to add value through information management and rich functionality (Timmers 1998). Since the original study, MICA has been applied to the government sector (Boon 1999) and tourism industry (Burgess and Cooper 2000) in Australia, resulting in its enhancement as an extended Model of Internet Commerce Adoption (eMICA). The central tenet of the extended model is that while businesses develop Internet commerce applications in stages as proposed by the original version of MICA, complexity and functionality vary greatly between applications, and even between businesses in an industry sector. In order to accommodate the wide range of Internet commerce development evidenced in industries such as tourism, the extended model proposes that a number of additional layers of complexity, ranging from very simple to highly sophisticated, exist within the identified main stages of MICA. The full eMICA model is summarised in Table 1 below.
Table 1: The extended Model of Internet Commerce Adoption (eMICA)
(Adapted from Burgess and Cooper, 2000)

<table>
<thead>
<tr>
<th>eMIC</th>
<th>Examples of functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1 - Promotion</td>
<td></td>
</tr>
<tr>
<td>Layer 1 – basic info</td>
<td>company name, physical address and contact details, area of business</td>
</tr>
<tr>
<td>Layer 2 – rich info</td>
<td>annual report, email contact, information on company activities</td>
</tr>
<tr>
<td>Stage 2 - Provision</td>
<td></td>
</tr>
<tr>
<td>Layer 1 – low level</td>
<td>basic product catalogue, hyperlinks to further information, online</td>
</tr>
<tr>
<td>interactivity</td>
<td>enquiry form</td>
</tr>
<tr>
<td>Layer 2 – medium</td>
<td>higher-level product catalogues, customer support (e.g. FAQs,</td>
</tr>
<tr>
<td>interactivity</td>
<td>sitemaps), industry-specific value-added features</td>
</tr>
<tr>
<td>Layer 3 – high</td>
<td>chat room, discussion forum, multimedia, newsletters or updates by</td>
</tr>
<tr>
<td>interactivity</td>
<td>email</td>
</tr>
<tr>
<td>Stage 3 - Processing</td>
<td>secure online transactions, order status and tracking, interaction with corporate servers</td>
</tr>
</tbody>
</table>

NEW ZEALAND REGIONAL TOURISM ORGANISATIONS

Tourism is a fragmented industry (Gretzel et al. 2000), and tourism promotion in New Zealand is a complex web of national, regional and local institutions frequently influenced by politics and personalities (Ryan 2001). At the national level, Tourism New Zealand receives about NZ$55 million for the marketing and promotion of the brand "New Zealand". Tourism New Zealand's strategy is largely Web-based, its "100% Pure New Zealand" theme acting as a portal (www.purenz.com) to various types of experiences (Ryan 2001). At the regional level, New Zealand has 26 Regional Tourism Organisations (RTOs). These are geographically-based destination marketing organisations, responsible for promoting the various regions of New Zealand domestically and internationally. RTOs have a role to play in providing comprehensive coverage of products and services in their region, irrespective of whether individual service operators have an independent online presence (Sharma et al. 2000). Within each region, tourism promotion is less structured, with many districts, towns and cities having Web sites that market tourism features to varying extents. In addition, there exists a Visitor Information Network that comprises 130 information offices throughout New Zealand. These offices provide tourist information to international and domestic visitors, and some maintain their own Web sites.
RTOs play a major role in destination marketing, pooling the marketing resources of both public and private sectors to achieve a coordinated effect, and providing a link between Tourism New Zealand, local tourism operators and visitors to the region (cf. Gretzel et al. 2000). New Zealand’s “Tourism Strategy 2010” envisages RTOs taking an enhanced role in domestic and international marketing, destination management, regional tourism planning and development, and facilitating provision of services to tourism operators in the near future (Tourism Strategy Group 2001). It is estimated that the aggregate budget of all RTOs is approximately NZ$25 million, although staffing and resources varies widely given their dependence on support from the local authorities and private sector in their region (Ryan 2001). Gretzel et al. (2000) note that destination marketing organisations, like New Zealand’s RTOs, often struggle with limited financial and human resources, and a lack of technical expertise.

All 26 New Zealand RTOs have established a Web presence, and a list of the RTOs with links to their Web sites was obtained from the Tourism Industry Association of New Zealand’s Web site (http://www.tianz.org.nz/tia/tia01.htm#rto). Each RTO link was verified, and the 26 Web sites were evaluated during May 2001. Each site was examined in detail and the various functions performed by the site were noted in a spreadsheet file. The functions and features across all the sites were then grouped according to their level of interactivity and sophistication. Each RTO site was matched against this ordered list, the results of which are shown below in Figure 1.

Figure 1: Functionality of 26 New Zealand Regional Tourism Organisations

<table>
<thead>
<tr>
<th>Key</th>
<th>Level of functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Email contact details</td>
</tr>
<tr>
<td>2.</td>
<td>Images</td>
</tr>
<tr>
<td>3.</td>
<td>Description of regional tourism features</td>
</tr>
<tr>
<td>4.</td>
<td>Systematic links to further information</td>
</tr>
<tr>
<td>5.</td>
<td>Multiple value-added features (key facts, maps, itineraries, directions, distances, news, photo gallery)</td>
</tr>
<tr>
<td>6.</td>
<td>Lists of accommodation, attractions, activities, events with contact details and/or links</td>
</tr>
<tr>
<td>7.</td>
<td>Web-based inquiry or order form</td>
</tr>
<tr>
<td>8.</td>
<td>Interactive value-added features (currency converters, electronic postcards, interactive maps, downloadable materials, special offers, guest books, Web cam)</td>
</tr>
<tr>
<td>9.</td>
<td>Online customer support (FAQs, site map, site search engine)</td>
</tr>
<tr>
<td>10.</td>
<td>Searchable databases for accommodation, attractions, activities, dining, shopping, events</td>
</tr>
<tr>
<td>11.</td>
<td>Online bookings for accommodation, tours, travel</td>
</tr>
<tr>
<td>12.</td>
<td>Advanced value-added features (multi-language support, multimedia, email updates)</td>
</tr>
<tr>
<td>13.</td>
<td>Unsecured online payment</td>
</tr>
<tr>
<td>14.</td>
<td>Secure online payment</td>
</tr>
</tbody>
</table>
EVALUATING THE RESULTS

Each RTO site was then assigned an appropriate stage and layer in eMICA based on the level of development of the site. The resulting data set was checked against the Australian regional tourism sites studied by Burgess and Cooper (2000), to maintain comparability of the results. A site needed to display functionality up to at least level 4 to be classified as Stage 2 of eMICA. Sites reaching level 8 functionality were classified as Stage 2, Layer 2, and those reaching level 11 functionality were classified as Stage 2, Layer 3. To be classified as Stage 3 of eMICA, a site required functionality at level 14. The results of the New Zealand study are shown below in Table 2, together with the equivalent figures from the Australian study (of 188 identified Australian RTO sites, Burgess and Cooper were able to evaluate 145).

Table 2: Results of the New Zealand RTO sites evaluated

<table>
<thead>
<tr>
<th>Stage of eMICA</th>
<th>Number of sites</th>
<th>% of total sites</th>
<th>% of Australian sites evaluated by Burgess and Cooper (2000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Layer 1</td>
<td>0</td>
<td>-</td>
<td>4.1%</td>
</tr>
<tr>
<td>LAYER 2</td>
<td>1</td>
<td>3.8%</td>
<td>4.1%</td>
</tr>
<tr>
<td>Stage 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LAYER 1</td>
<td>8</td>
<td>30.8%</td>
<td>36.6%</td>
</tr>
<tr>
<td>LAYER 2</td>
<td>12</td>
<td>46.2%</td>
<td>40.0%</td>
</tr>
<tr>
<td>LAYER 3</td>
<td>4</td>
<td>15.4%</td>
<td>15.2%</td>
</tr>
<tr>
<td>Stage 3</td>
<td>1</td>
<td>3.8%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

The majority of the New Zealand RTO sites were developed to Stage 2 of eMICA, and incorporated the standard functional attributes of the first stage of development, such as email contact details, the use of photographic images, and a description of regional tourism features. However, the level of functionality and sophistication varied greatly across the three levels comprising this second stage of development, as discussed below. One RTO site was categorised as developed to Stage 1, Layer 2 of eMICA. This site was basically a single-page description of regional tourism features, but displayed limited evidence of higher interactivity in the form of a small number of unorganised links to external sites and maps. At the other end of the model, only one of the sites evaluated was developed to Stage 3, with the capability of offering secure online credit card payment for accommodation and travel bookings.

The major differentiation in the New Zealand RTO sites lay within Stage 2 of the eMICA model. Those sites located within the first layer of Stage 2 had some form of navigation structure such as buttons with links to different parts of the site. They had numerous internal and external links to further information, and incorporated value-added features characteristic of the tourism industry such as key facts (on location, climate, weather and services), maps, itineraries, news and media releases, and a photo gallery. Often, there would also be a more interactive feature such as a currency converter or a Web-based contact form. These sites also contained information on accommodation, attractions, activities and events in the region, usually in the form of a list organised by category and with contact details and/or links to the third-party operator (where available). Some of these lists appeared to be database-driven using technology such as “active server pages” (ASP).

At Layer 2 of Stage 2, the value-added tourism features became increasingly interactive, and included electronic postcards, interactive maps, downloadable materials, special offers, guest books, and the use of Web cams. Sites at this layer incorporated some form of online customer support, such as FAQs, a site map or an internal site search engine. User interaction also included the use of Web-based enquiry or order forms. Information on accommodation, attractions, activities, dining, shopping, and events was provided via searchable databases, with searches available by type and/or location within the region. As sites progressed to Layer 3, the key feature was the facility to accept online bookings for accommodation, tours and travel. Two of these sites offered unsecure online payment of booking deposits by credit card. One of the sites had advanced value-added features that
included multi-language support, multimedia, newsletter updates by email, streaming video, and a QuickTime virtual tour.

Comparing the results of the New Zealand RTO Web site evaluations with the Australian study, we find a good level of consistency. In both cases, most of the organisations in this industry sector are at a relatively advanced stage of adoption of Internet commerce. The majority have incorporated various levels of functionality consistent with the three layers identified at Stage 2 of eMICA. This is consistent with the focus of this industry sector on tourism promotion and the provision of information and services that enable potential tourists to the regions to make informed travel decisions and choices.

DISCUSSION

The information-intensive nature of the tourism industry fits particularly well with interactive media like the Web, and indications are that tourism Web sites are constantly being made more interactive (Goodrich 2000a, Gretzel et al. 2000, Hanna and Millar 1997, Marcussen 1997, WTO Business Council 1999). Moving from simply broadcasting information to letting consumers interact with the Web site content allows the tourism organisation to engage consumers’ interest and participation, increasing the likelihood that they will return to the site, to capture information about their preferences, and to use that information to provide personalised communication and services. The content of tourism destination Web sites is particularly important because it directly influences the perceived image of the destination and creates a virtual experience for the consumer. This experience is greatly enhanced when Web sites offer interactivity (Cano and Prentice 1998, Gretzel et al. 2000, Legoherel et al. 2000).

Interactive Web site presentation runs a spectrum from information provision, through brochure ordering and inquiry services, to booking and payment online (Marcussen 1997). A summary of the key features of 25 “best practice” destination marketing organisations, evaluated by the World Tourism Organization, is presented by Goodrich (2000b). These features included navigational assistance and branding on the home page, multiple means of communication (including the use of colour, photographs, maps, symbols, and multimedia), interactivity, rich information on a wide range of topics, the use of managed and updated databases, and multilingual support. Standing and Vasudavan (1999) used a similar list of functions in their evaluation of Australian travel agents’ Web sites. Their features included provision of product, service and destination information, transaction capability, customer interaction and feedback, and links to value-added information sources. Although Standing and Vasudavan were evaluating travel agencies, it is interesting to note that relatively few sites provided higher levels of interactivity such as online booking, payment and customer service.

The Web sites of the New Zealand RTOs display the same range of functionality as these earlier studies, and can be distinguished on the basis of the level of interactivity they offer to the consumer of tourism information and services. In fact, the eMICA model uses interactivity as the primary means of establishing the various stages of Internet commerce adoption. This study confirms the usefulness of Web site interactivity for this purpose. The results of the study suggest that in the tourism industry, major milestones in Internet commerce development are: moving beyond a basic Web page with an email contact, to providing links to value-added tourism information and the use of Web-based forms for customer interaction; offering opportunities for the consumer to interact with the Web site through (a) value-added features such as sending electronic postcards or recording their experiences and reading others’ experiences in Web-based guest books, and (b) the provision of online customer support via internal site search engines and searchable databases; the beginnings of Internet commerce transactions with the acceptance of online bookings for accommodation, travel, and other tourism services; full adoption of Internet commerce, where consumers are able to complete transactions online through secure Internet channels.

Only one of the New Zealand RTO sites displayed interactivity at this last transactional level. Perhaps, as Burgess and Cooper (2000) note, this is not an unusual finding, given that the organisations in this industry sector are in the business of promoting regions and their unique features and offerings primarily through the provision of value-added information and services. Further adoption of Internet commerce is likely to depend on the future role taken by RTOs in New Zealand (Tourism Strategy Group 2001). However, this development may well occur on the supply side in facilitating the provision of services to tourism operators in their region, or in coordinating efforts between alliances of RTOs with perceived common interests. This would involve the deployment of more sophisticated Internet and Web technologies, such as intranets, extranets, electronic marketplaces and even mobile portals, consistent with the shift in emphasis from business-to-consumer electronic commerce to business-to-business electronic commerce observed in other sectors of the economy (Kalakota and Robinson, 2001).
CONCLUSION

This paper has evaluated the Web sites of the 26 New Zealand Regional Tourism Organisations. The RTOs generally displayed a high level of interactivity, consistent with their role in providing comprehensive destination marketing for geographic regions in which many local tourism operators lack an Internet presence. However, almost all the RTOs stopped short of offering consumers the capability to complete their tourism and travel transactions online. Progression beyond this point is likely to depend on the overall maturing of Internet commerce use by domestic and international consumers, or a change in the role of RTOs as envisaged in the New Zealand Tourism Strategy 2010 (Tourism Strategy Group 2001).

The outcome of the research is a useful confirmation of the staged approach to development of commercial Web sites proposed by the extended Model of Internet Commerce (eMICA). Further, the comparative results of the New Zealand and Australian studies suggest that regional tourism organisations in both countries are at a similar, relatively sophisticated stage of development on the Internet commerce roadmap.

Future comparative research on an international level would help assess the “Net-readiness” of the tourism industry globally. In addition, the link between tourism spending and high Internet usage alluded to in this paper needs further research to establish whether a relationship between the two does in fact exist.
REFERENCES


Product Option Choice Decisions and the Influence of Framing: an E-commerce Example

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ABSTRACT

The literature suggests that alternative portrayals of a decision problem may give rise to different consumption consequences, contrary to the rational theory of choice. The author examines the effects of using an additive versus subtractive option framing method on consumer choice in two markets increasingly facilitated by e-commerce.

Key words: Bounded rationality, Decision making, Framing, Loss aversion, Reference dependence

INTRODUCTION

One view of the rise of electronic commerce suggests that consumers will be empowered by access to more competitive markets and larger amounts of product and price information. They will benefit from greater control over information (to search for better products at lower prices) and reduced search costs associated with finding and comparing alternatives. In other words, e-commerce has the potential to reduce market failure associated with imperfect information.

The suggested revolutionary power of the on-line commerce environment is, however, tempered by the introduction of psychological considerations. One example is framing, illustrated by the joke about two priests and a bishop. One asks whether he can smoke while praying; the other asks if he can pray while smoking — you can guess which one received an affirmative answer. The way in which information is framed depends upon the language of presentation, the context in which the choice is to be made, and on the way in which information is displayed.

In this paper, I conduct an on-line experiment which attempts to verify how the way in which information is framed causes consumers to violate the principles of invariance and dominance associated with the utility maximisation paradigm in economics. Empirical validation of the effect of option framing on consumer choice in computer based decision environments is desirable from a managerial perspective in the development of strategies regarding the online positioning and pricing of products; the ability to use price discrimination techniques and so on. There are also consumer welfare issues associated with framing.
THEORETICAL BACKGROUND – BOUNDED RATIONALITY AND FRAMING

From the economic point of view, there is no reason to suspect that the theory of choice which applies in the physical goods market should not apply in computer assisted decision environments. In the utility maximisation paradigm, decision makers in riskless environments are assumed to be completely rational, fully informed about the possible courses of action and their consequences, and infinitely sensitive to differences in alternatives. Decision makers faced with uncertainty or risk would maximise expected utility after adjusting for the probability of an event. In this paradigm, decisions would always have an optimal outcome. But most consumers are not rocket scientists! Simon (1955) argued that actual decision making behaviour is better explained in terms of 'bounded rationality'. A boundedly rational decision maker attempts to attain a satisfactory (not necessary maximal) outcome. Simon labelled this 'satisficing'.

Essentially, normative economic theory focuses on the rationality of outcomes, whereas the information processing view that developed as a result of Simon's work and the involvement of other disciplines, such as psychology, aimed to understand process rationality. This branch of economics has come to be known as 'behavioural economics'.

Many behavioural studies report systematic errors (biases) in the mental tasks associated with decision making. This is so even on tasks which are relatively simple in comparison with many real world economic decisions. According to Conlisk (1996) psychologists hypothesise that agents make these systematic errors because they use decision heuristics (discovery aids or rules of thumb) which do not accommodate the full logic of a decision (due to incomplete information, insufficient processing power and so on). This recognises that most consumers are boundedly rational and cannot cope with the complexities that utility maximisation would imply. Consumers have limited capacity to receive, process, store and retrieve information. They are, therefore, not only constrained by their budget, but by their inability to make optimal choices.

One type of systematic error which has been reported in several studies (see, for example, the review article by Conlisk, 1996) is how the frame of reference influences consumer perception and judgement. Framing manipulations influence both the salience of the good, and the significance of gains or losses (Bettman et al, 1998). People tend to accept the frame presented in a problem and evaluate options in terms of a reference point suggested by that frame.

Framing is controlled by norms, habits and expectancies of the decision maker. Of interest in markets for information goods is that it is also controlled by the manner in which information is presented. According to Tversky and Kahneman, (1987, p.73) 'failures of invariance are explained by framing effects that control the representation of options, in conjunction with nonlinearities of value and belief. In effect, the framing effect suggests that people choose between descriptions of alternatives rather than the alternatives themselves.

Because framing effects and their associated failures are ubiquitous, no adequate description of consumer behaviour can ignore this phenomenon. Puto (1987) provides a conceptual framework of the buying decision framing process. The human perceptual apparatus, he says, is tuned to an evaluation of changes or differences rather than the evaluation of absolute magnitudes. Two examples would be 'heat' and 'brightness', where judgement is by comparison with recent experience rather than against an absolute measure. The past and present context of experience thus defines a reference point against which new stimuli are judged. Outcomes are coded as gains or losses relative to some reference point (more or less; gains or losses)

Tversky and Kahneman (1987) illustrate this using an S shaped value function which has two main properties. Firstly, the S shape reflects the diminishing effect of a marginal change in gains or losses, so it is concave above the reference point (gains) and convex below it (losses). Secondly, the slope of the value is function is steeper for losses than for gains. This is described as 'loss aversion' – the response to losses is more extreme than the response to gains.

Because framing effects and their associated failures are ubiquitous, no adequate description of consumer behaviour can ignore this phenomenon. Puto (1987) provides a conceptual framework of the buying decision framing process. The human perceptual apparatus, he says, is tuned to an evaluation of changes or differences rather than the evaluation of absolute magnitudes. Two examples would be 'heat' and 'brightness', where judgement is by comparison with recent experience rather than against an absolute measure. The past and present context of experience thus defines a reference point against which new stimuli are judged. Outcomes are coded as gains or losses relative to some reference point (more or less; gains or losses)

Thaler (1985) illustrates loss aversion by reference to the perceptual difference between surcharges and discounts, noting that it is easier for the consumer to forego a discount than accept a surcharge because the same price difference is valued as a gain in the former case and a loss in the latter case. Tversky and Kahneman (1986, p. 77) cite another example – the credit card lobby is said to insist that any price difference between cash and card purchases should be labelled a cash discount rather than a credit surcharge'.

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THE EXPERIMENT

Two products were chosen for inclusion in this study – film processing and comprehensive motor vehicle insurance. These services were chosen because many firms use the Internet to provide consumers with information about these products and associated options; enable consumers to obtain quotes for various price/quality combinations; and enable consumers to enter into contracts for sale.

Following Park et al., (2000) product information was framed by asking respondents to add desired product options to a 'base model', or delete undesired options from a 'fully loaded' model.

Five hypotheses are tested.

**Hypothesis 1:** Consumers will choose more options in the subtractive options framework than the additive options framework. For many goods, the task of selecting options is an important part of consumer decision making. Managers can frame information in such a way that it asks consumers to add desired product options to a base level product, or delete undesired options from a fully loaded product. In the first instance, choice of options is guided by anticipated gains in utility at the expense of loss of monetary resources. In the second, option choice is a trade-off between the anticipated loss of utility, and the lower price paid. In other words, consumers will use the price to which they are first exposed as an 'anchor'.

**Hypothesis 2:** Lower option prices increase the number of options selected in the additive options framework in comparison to the full price options. I test whether any significant difference in the number of options chosen under each frame is modified if the prices of options are a smaller proportion of the overall cost.

I also anticipate that the two option framing methods will elicit different psychological reactions from consumers, and will test three related hypotheses.

**Hypothesis 3:** Overall, the perceived value of the final chosen bundle is higher in subtractive options framework than additive options framework.

I predict that option framing may affect consumers' perceptions of the bundle they ultimately select. If consumers delete less options under a subtractive options framework than they add to the base model in an additive options framework, this suggests that they perceive the products under subtractive options framework as offering more utility.

**Hypothesis 4:** Decision difficulty is greater in subtractive options framework than additive options framework. I predict that consumers engaged in subtractive options framework will perceive the task of making option choices more difficult than those engaged in additive options framework. In the subtractive options framework, the trade-off is utility loss vs monetary gain. In the additive options framework, the trade-off is utility gain vs monetary loss. If so, this is consistent with the S shaped value function described by Tversky and Kahneman (1987). If decision difficulty is influenced by framing, we would also expect the length of time which respondents report for making their decision to be higher in the option deletion frame. Thus there is a final hypothesis.

**Hypothesis 5:** Consumers take more time to make a decision in subtractive options framework than additive options framework.

Students (both undergraduate and postgraduate) at two Western Australian universities participated in the study. No remuneration or incentives were offered for participation. Eight web pages, each specifying an 'offer', were established to deliver information to respondents and collect responses. To manipulate option framing, subjects were assigned cyclically to one of the offers. Offers 1-4 were for film processing; offers 5-8 concerned car insurance. Offers 1, 3, 5 and 7 offered subjects the chance to add options to a base model, with options in offers 3 and 7 being half the price of their full price counterparts. Similarly, offers 2, 4, 6 and 8 gave participants the chance to delete options from a fully loaded model. Offers 2 and 6 were for full price options.

In each case, subjects were asked to assume that they had formed a definite intention to purchase the reference product (either the base level product in additive options framework or the fully loaded product in subtractive options framework). Subjects could then choose to add/delete options in each offer. In the case of film processing these options consisted of a second set of prints, replacement film, additional delivery of processed...
film on CD, additional delivery via a web page accessed by password, and a hypothetical software bundle consisting of a tool to make screensavers and e-jigsaws from the processed film. The motor vehicle insurance options consisted of an excess waiver, free windscreen replacement, 14 day car hire, agreed value option, and new car replacement option. A short description was given for each option, but respondents were not able to 'click through' to find any other information.

The list of product options was derived from information available on a range of commercial web sites which enable consumers to explore product characteristics / obtain quotations / conduct transactions relevant to these product choices. To confirm that these options were relevant to prospective student respondents, a pretest (n= 47) was conducted in which subjects were asked to rate the importance of a number of options (1 = not important, 7 = highly important). As there was no significant difference to suggest that any option was of less value than any other, the range of options was confirmed.

In addition to the decision making process involving their choice of options, subjects were asked to complete measures assessing a range of psychological reactions related to their decision making process. The six values were assessed on five-point semantic differential scales relating to their degree of price consciousness, their degree of value consciousness, the degree of enjoyment subjects experienced in choosing their options, the degree of difficulty they faced in choosing options, and a final rating as to 'value for money', which was intended as a way of interpreting the utility which consumers would derive from their final 'package' for either commodity.

Two open-ended questions completed the survey. The first referred to the perceived degree of riskiness in the choice process and the length of time taken to undertake the option choice part of the questionnaire. The second asked whether the subject's decision making would have been enhanced by the ability to click through to find more detail about each option.
RESULTS

Table 1: Reports the descriptive data and one way ANOVA results relating to H1

<table>
<thead>
<tr>
<th>Good/s</th>
<th>Frame</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>AOF</td>
<td>29</td>
<td>1.76</td>
<td>0.99</td>
<td>0.975</td>
</tr>
<tr>
<td>Both</td>
<td>SOF</td>
<td>26</td>
<td>3.19</td>
<td>1.06</td>
<td>1.122</td>
</tr>
<tr>
<td>Film</td>
<td>AOF</td>
<td>14</td>
<td>1.46</td>
<td>1.05</td>
<td>1.103</td>
</tr>
<tr>
<td>Film</td>
<td>SOF</td>
<td>13</td>
<td>3.09</td>
<td>1.04</td>
<td>1.091</td>
</tr>
<tr>
<td>Car insurance</td>
<td>AOF</td>
<td>15</td>
<td>2</td>
<td>1.02</td>
<td>1.21</td>
</tr>
<tr>
<td>Car insurance</td>
<td>SOF</td>
<td>13</td>
<td>3.23</td>
<td>1.23</td>
<td>1.26</td>
</tr>
</tbody>
</table>

d.f = 1/53; F = 26.983; p<0.001

Note: AOF = additive options framework, SOF = subtractive options framework.

Levene's test for homogeneity of variance is not significant (p<0.05). As expected, option framing significantly affected the number of options selected. Results are also shown for each of the two goods separately.

Table 2: Reports the descriptive data and ANOVA results relating to H2. The null hypothesis could not be rejected, contrary to expectations

<table>
<thead>
<tr>
<th>Price</th>
<th>Frame</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Half</td>
<td>AOF</td>
<td>15</td>
<td>1.83</td>
<td>1.07</td>
<td>1.146</td>
</tr>
<tr>
<td>Half</td>
<td>SOF</td>
<td>13</td>
<td>3.31</td>
<td>1.07</td>
<td>1.146</td>
</tr>
<tr>
<td>Full</td>
<td>AOF</td>
<td>14</td>
<td>1.69</td>
<td>0.99</td>
<td>0.975</td>
</tr>
<tr>
<td>Full</td>
<td>SOF</td>
<td>13</td>
<td>3.07</td>
<td>1.06</td>
<td>1.122</td>
</tr>
</tbody>
</table>

d.f = 1/53; F = 2.348; p = 0.09

Note: AOF = additive options framework, SOF = subtractive options framework.

H3 predicted that option framing may affect consumers perceptions of the bundle they ultimately select. If consumers choose more options under subtractive options framework than additive options framework, this suggests that they perceive the products under subtractive options framework as offering more value.

Table 4: Reports descriptive data and one way ANOVA results for H3. Again, the null hypothesis could not be rejected at the 5% level.

<table>
<thead>
<tr>
<th>Frame</th>
<th>N</th>
<th>Mean value</th>
<th>Std. Dev.</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>additive options framework</td>
<td>29</td>
<td>3.31</td>
<td>1.04</td>
<td>1.091</td>
</tr>
<tr>
<td>subtractive options framework</td>
<td>26</td>
<td>3.81</td>
<td>0.80</td>
<td>0.642</td>
</tr>
</tbody>
</table>

d.f = 1/53; F = 3.341; p = 0.073

Table 5 reports descriptive statistics and one way ANOVA results relating to H4. It was predicted that consumers engaged in choosing options under a subtractive options framework would perceive the task of making option choices more difficult than those engaged in additive options framework. In the subtractive options framework, the trade off is utility loss vs monetary gain. In the additive options framework, the trade off is utility gain vs monetary loss. As expected, the degree of difficulty which subjects report is higher for those making decisions under the subtractive options framework than for those adding options to the basic product (significant at the 0.05 level).

Table 5: Reported decision difficulty / frame

<table>
<thead>
<tr>
<th>Frame</th>
<th>N</th>
<th>Mean value</th>
<th>Std. Dev.</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>additive options</td>
<td>29</td>
<td>1.97</td>
<td>1.02</td>
<td>1.034</td>
</tr>
</tbody>
</table>
Finally, it was hypothesised (H5) that if decision difficulty is influenced by framing, there would be a significant difference between the time which respondents report for making their decision in each framework. The mean time taken by those using a subtractive options framework was 102 seconds, compared to 88 seconds for those using the additive framework. This was significant at the p < 0.1 level. Interestingly, the relative difference in time taken under each frame for film processing was much higher than the time taken in each frame for motor vehicle insurance.

DISCUSSION

The results of this experiment reveal interesting findings about the effects of option framing on consumer choice decisions for these goods.

As noted in Table 1, framing has a significant effect on option choice, although the confidence level for car insurance is lower. Logically, the end states for each frame were the same, but differences in descriptions and reference points associated with each frame caused very different outcomes. It is possible that this result reflects differences between the types of goods chosen for the survey. Zhang and Buda (1999) found that the message framing effect for low 'need for cognition' goods was more significant than was the case for high need for cognition goods. This may also be supported by the fact that the average response time by subjects choosing options for motor vehicle insurance was 141 seconds, as against 52 seconds for respondents choosing film development options. We could infer that insurance has a higher need for cognition than film processing, but the difference in 'processing' time could also be associated with the (student) subjects' level of experience in the film processing and car insurance markets. Perhaps film processing decisions might incorporate a learning effect as they are made several times per year and may be regarded more as search goods rather than experience goods. Motor vehicle insurance decisions, by contrast, are made less frequently, and may be subject to inertia as the cognitive load associated with change may outweigh the potential benefits of change.

The results associated with the subjects' reaction to the option choice process also bear out the predictions made in the literature. The significant difference in the difficulty the subjects felt in making decisions in both frames suggests that the loss aversion discussed previously applies for those committed to making a decision on the basis of the information available about the fully loaded model. The issue of commitment may be of interest. The high commitment which subjects were asked to assume may act as a boundary for the managerially positive effect of the subtractive options framework. This may be important in markets facilitated by e-commerce, as the literature indicates there is a high 'click through' rate on many web sites and a low conversion of visits to sales.
As noted in the results associated with H4, a subtractive options framework adds to both conceptual and monetary cost which would reduce the time and income available for other welfare enhancing activities. Questions might therefore be asked about consumer welfare in situations where managerial practice was to offer the fully loaded product as a default option, knowing that committed consumers would spend more on the product than might be the case if the base model was offered.

The picture painted in the introduction to this paper was of an efficient frictionless market which would increase consumer surplus. On the contrary, framing suggests an increase in producer surplus if consumer decisions can be manipulated by subtle elements of information and persuasion. A prominent feature of information goods is that they have large fixed costs of production and small variable costs of reproduction. According to Varian (1997) cost based pricing makes little sense in the information goods context. Value based pricing is more appropriate because consumers place different values on information goods.

Economists use the term 'price discrimination' to describe value based pricing. Varian describes how this is used in e-commerce under the label 'versioning'. The point of versioning is to get consumers to sort themselves into various groups according to their willingness to pay (i.e. self selection). To completely capture consumer surplus, the number of versions of a product should be equal to the number of types of consumers in the market.

The managerial implication of this, according to Varian (1997) is to design a product so it can be versioned. The modularisation that characterises many information goods (even physical ones such as books and CDs) makes it far easier to remove features than it is to add them.

FURTHER RESEARCH

According to Conlisk (1996), Bettman et al (1998) and Tversky and Kahneman (1987), the theory of framing is as yet incomplete. This research yields several implications for further study. From a managerial perspective (marketing, product and information design), research into the differential effects of various framing cues might be undertaken. Another research implication concerns decision making for various types of good or service. Perhaps previous experience in making some types of decisions, or in making decisions for some types of goods reduces the framing effect. This refers to the notion of learning – whether experience enables people to make more optimal decisions.
REFERENCES


Some Thoughts on Managing E-Commerce Risks

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ABSTRACT

This paper is concerned with the risks in e-commerce. The general e-commerce risks are identified and some risk management solutions are proposed and analysed. In particular, we show how to assess e-commerce risk exposures and we discuss the need of hedging and insuring e-commerce risks.

Key words: e-commerce, risks, risk map, risk management, insurance and hedging

INTRODUCTION

E-commerce i.e. electronic commerce can be loosely defined as ‘doing business electronically’, see e.g. Timmers(1998). E-commerce includes electronic trading of physical goods and intangibles such as information. This encompasses all the trading steps such as online marketing, ordering, payment, and support for delivery. Electronic commerce includes the electronic provision of services, such as after-sales support or online legal advice. Finally it also includes electronic support for collaboration between companies, such as collaborative design.

Some forms of electronic commerce exist already for over twenty years, e.g. electronic data interchange (EDI), in sectors such as retail and automotive and CALS (Computer Assisted Lifecycle Support) in sectors such as defence and heavy manufacturing.

These forms of e-commerce have been limited in their diffusion and take-up. In recent years, however, we see an explosive development in e-commerce. The reasons for that are, of course, the Internet and the World Wide Web, which are making e-commerce much more accessible. They offer easily useable and low cost forms of e-commerce. E-commerce on the basis of the Internet is set to become a very important way of doing business.

Although there is a downturn in the dot.com sector, E-commerce is continuing to emerge and develop. The risks associated with e-commerce are also becoming more and more important. Unlike the mature financial risk management, e-commerce risk management is at its early development stage. Without doubt, many ideas and principles from financial risk management will be useful for e-commerce risk management.

Unpredictable movements in exchange rates, interest rates, and commodity prices not only can affect a firm’s reported earnings but even determine whether a firm survives. Over the past two decades, firms have been increasingly challenged by such financial price risks. In response to these risks, a wide range of financial derivatives such as options, forwards, futures, swaps etc. have been introduced into the market and become available to manage these financial risks, see e.g. Chance (2001) and Smithson (1998). In contrast to the wide range of products designed for managing financial risks, to the author’s best knowledge, there are hardly any financial products available designed for managing e-commerce risks and there are few insurance policies for e-commerce risks. Along with the rapid development of e-commerce, managing risks associated with e-commerce is becoming an important and critical issue.
In order to manage risks, a firm must know what risks it faces and how big they are. Consequently, the firm must implement a ‘system’ for measuring risk. This general rule does apply to e-commerce. In this paper, we attempt to identify the key risks in e-commerce and propose some solutions for managing them. In particular, we shed some lights on the further development of hedging and insuring e-commerce risks.

**IDENTIFYING RISKS IN E-COMMERCE**

As e-commerce is still a relatively new form of commerce, the potential legal risks are very real. Failure to consider the complexities of old and new laws as they affect commercial activities on the Internet will reduce the income potential and increase tax liability and other legal risk of an e-commerce business. For a more detailed discussion on legal risks in e-commerce, we refer to Greif (2000). Here we are more concerned with the operation risks in e-commerce.

Some e-commerce risks are obvious. The current privacy and security fury on the web makes these risks hard to overlook. Privacy and security risks are clearly important issues for insurance and financial services. The gathering and exchange of large amounts of non-public personal consumer information makes these industries particularly vulnerable.

There are many additional risks in e-commerce. To consider the e-commerce risks for a firm, a systematic approach such as a checklist is necessary and useful. The following list categorises e-commerce risks as web site specific risks, commerce risks, intellectual property risks, security risks, downstream liability risks etc.

**Web Site Specific Risks**
- Links and framing
- Meta tag abuse

**Commerce Risks**
- Unfair trade practices and fraud
- Property damage
- Advertising violations
- Privacy of customer information
- Defective hardware and software
- Unfair competition and antitrust violations

**Intellectual Property Risks**
- Domain name hijacking
- Copyright and trademark infringement
- Disclosure of trade secrets
- Online intellectual property infringement liabilities
- Defamation

**Security Risks**
- Loss of web site
- Loss of credit data
- Loss of advertising and electronic funds
- Viruses
- Employee error
- Theft of information
- Modification of system or data
- Denial of service
**Downstream Liability Risks**

Hacker damage to a company that results in the company damaging others  
Damage from within a company that results in the company damaging others

The triggers of the risks above may be hackers, fraud, virus, network crashes and other operational problems. All risks can be severe, some of them may be even fatal to a business. The importance of each risk may vary from business to business. To manage e-commerce risks, it is important to go through the above check list and be aware which are the key risks related to one's business. In the next two sections, we propose some solutions to manage these risks.

**SPECIFYING RISK EXPOSURE**

Risk assessment involves a combination of a variety of formal and informal methods. It is practised in a variety of areas, by individuals with a wide spectrum of skills. Its goals is to determine the probabilities and impacts of various events. This data then can be used to provide guidance on the proper management of risks.

A significant risk assessment tool is a simple graph known as a risk map. A risk map is a two-dimensional chart that shows the probabilities on one axis and the consequences (losses) on the other. Understanding the risks faced by an organisation begins with mapping the probability and consequence characteristics in a risk map. These numbers can come form a variety of sources. More formal methods involve the collection of statistics and the use of loss scenario analysis to calculate the probability of outcomes from those of underlying events. They are an expression of the analysts' intuitive understanding of the risks an organisation faces. A good example of how to use risk map in managing risk is given in Jablonowski (2001). As an illustration, the risk map for the security risks in a hypothetical e-commerce business is shown in Figure 1.
How risks are dealt with depends on where they fall on the risk map. Risks in the upper right quadrant of the map (e.g. the virus risk in Figure 1), those with high probability of severe consequences, represent serious danger to an organisation. They must be avoided, their probability and consequences reduced, or their effects transferred via some mechanism like insurance. The risk map provides a direct link between the analysis of risk exposures and the selection of techniques for dealing with these exposures.

The general risk assessment rules can be applied to e-commerce. In assessing the risks related to an e-commerce business, we need first to estimate the consequences associated with the risks. This may not be too hard to estimate in practice. Then we need to estimate the probabilities related to each risk. In practice, this may be hard and may not be accurate enough due to the shortage of historical data and comparison data. For a specific e-commerce business with sufficient historical data, we can use the historical data to predict the probabilities of the loss due to, for example, hackers in a specific period. Of course, such probability may be evolving overtime due to technology progress or changes in legal environment.

Armed with the information presented on the risk map, risk events can be modelled using simulation. Simulations are computer programs that use probability and loss information as inputs. They can be used to develop and test various risk management options in a realistic yet controlled environment. It is in this sense that the probability/loss analysis precedes that development of useful holistic risk management techniques. We need to know what we are up against before we can develop workable solutions.

INSURING AND HEDGING RISKS

Given the nature of risks faced by an e-commerce business, it is impossible to eliminate all the risks totally. However, the risks can be reduced greatly if some proper risk-reduction measures are taken.

One way of mitigating the risks is to take insurance cover against eg. hackers, fraud, and network crashes etc. This method is rarely taken as it is very expensive to cover all the risks related to e-commerce so that the costs of insurance often outweigh the benefits. Besides, such insurance policies may not even exist. Thus an e-business firm often sets up a fund and self-insures, see Ferguson (1999). It is not an overnight process and insurance policies are being quickly developed in this aspect. Without doubt, the overblown fears in e-commerce will benefit the insurance industry and more insurance policies for e-commerce risks will be developed soon.

The hedging concept in financial risk management is relevant to managing e-commerce risks. In investments, hedging refers to buying an asset to reduce the risk in a portfolio. The term is common in futures and foreign exchange markets where traders use facilities available to protect themselves against future price or exchange rate variations. If someone bulk buys scotch whisky ahead of the budget in anticipation of a price rise in the budget, then he or she is hedging (provided the whisky is drunk—if it were bought to be sold, then the buyer is speculating).

To hedge e-commerce risks, we need to use some financial products such as a ‘technology failure put option’. Under such an option, the buyer of the put option will receive some compensation payment if some technology risks strike. Thus such an option can offset some or all of the damage from those risks for the buyer’s e-commerce business. But the buyer needs to pay a premium for having such a protection. Hedging essentially involves pooling the risks and trading them in the market place. Hedging does not eliminate any risks, rather it transfers risks to the market. The mechanism is quite similar to insurance. The only difference is that for hedging the risks are transferred to the market rather than the insurer. The benefit of hedging for an e-commerce firm is the reduction in e-commerce risks, typically as depicted in Figure 2. That is, by hedging, an e-commerce firm can have a more stable income.
The key advantage of hedging over insurance is that the financial products used for hedging are traded in the market and hedging position can be closed off easily by taking an opposite position in the option. Due to the need in hedging e-commerce risk, special derivatives products will be developed and available in the market. A good example is the recent endeavour by Enron Corp. to create a financial risk management market for advertising, see Clark (2001) for more details.

![Diagram of income and hedged income](image)

**Figure 2: The effect of hedging**

**SOME RISK MANAGEMENT POLICIES**

Risks do exist with e-commerce as shown in the previous section. We have to live with them whether we like them or not. After the risk assessment, the next thing is to implement a set of risk management policies. Of course, risk management policies should be firm specific. The need of hedging or insuring will also vary from firm to firm. Nevertheless, there are some common characteristics with e-commerce firms that call for some common management policies. Some of the common rules are as follows.

- Do not depend solely on firewalls. Firewalls help thwart external threats, but the integrity of your e-commerce system can also be jeopardised from inside your organisation, for example, it could be by a disgruntled employee.

- Design security into your e-commerce strategy. Security as an afterthought maximizes the odds of key systems gaps.

- Install systems capable of handling volume spikes. Boosting the traffic capacity of your e-commerce and makes the web site less vulnerable to hackers attempting to flood it and shut it down.

- Constantly probe for system weaknesses. Consider hiring friendly hackers to see how easy or difficult it is to infiltrate your computer system.

- Create centralised responsibility for assessing and addressing system vulnerabilities. Choose one person, such as the chief information officer or IT manager, who will be accountable for assessing and fixing such system vulnerabilities.

- Emphasise early detection and loss mitigation systems. Put software and personnel in place to detect problems early and to allocate resources that limit any damage to your e-commerce business.

- Take legal action against attackers. Some companies and personnel are reluctant to take legal action because they fear that the publicity will hurt their bottom line. But legal action is the best way to deter future mischief.

- Monitor continually and update your system. This will allow your firm to be at the forefront of fighting risks.

- If necessary and available, insure or hedge your e-commerce risks.
The above list is definitely not exhaustive. Many more can be surely added to the list. It is necessary for one to take its own specific business situation into account and draw up a proper list of rules to follow. In short, good risk management policies are important and necessary for e-commerce risk management.

CONCLUSIONS

E-commerce risks will become an important and critical issue along with the rapid development of e-commerce. Some major risks in e-commerce are addressed in this paper. In assessing the risk exposure of an e-commerce business, we recommend the use of a risk map. Risks such as Internet failure etc. can be effectively reduced by insurance or hedging, both are at early developing stage for the e-commerce sector. Some financial products are needed for effectively managing the e-commerce risks. We believe that such products will soon be developed and eventually will play an important role in the further development of e-commerce. Finally, we propose some e-commerce risk management policies which are common to e-commerce businesses.

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Valuations of Dot.Coms: Some Implications from the Recent Market Plunge

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ABSTRACT

Internet companies have suffered a great loss in their market value recently, though their share prices were skyrocketing two years ago. This fact casts doubts on the credibility of the valuations of dot.coms and even the methods used in the valuations. This paper attempts to provide some analysis and insight to understanding these issues. The validity of the discounted cash flow models is addressed. The major difficulties in valuing dot.coms are discussed and some solutions are proposed to circumvent these difficulties. Finally, some valuation examples are presented to illustrate the key points in valuing dot.coms.

Keywords: Internet companies, dot.coms, valuation, discounted cash flow models, speculative bubbles.

INTRODUCTION

In early 2000, Internet entrepreneurs had succeeded in quickly transforming their business ideas into billion-dollar valuations that seemed to defy common wisdom about profits, multiples, and the short-term focus of capital markets. Valuing these high-growth, high-uncertainty, high-loss firms is a challenge. Some practitioners have even described it as hopeless. For example, Wang (1998) argued that the benchmarks can be elusive for valuing Internet companies.

Now the picture for Internet companies is totally different. Many Internet companies including those like AOL, Yahoo, eBay and Amazon with sound business models and experienced management have seen their values plummet. The days of easy money are gone. Unless your Internet startup falls into broadband, infrastructure, wireless, or optical networking plays, your ability to raise private equity or venture capital is negligible, as pointed out in Charteranand (2001).

The abrupt fall of the Internet companies has cast many doubts on the credibility of the valuations of dot.coms done in the past. For example, Copeland et al. (2000) obtained an equity value of 23 billion for Amazon.com in 1999, that is, $66 per share. Damodaran (2001) published a valuation of Amazon in March 2000 and valued its equity at 11.955 billion dollars, that is, $35/share. On the other hand, the market price of Amazon was around $98 in December 1999, $26 in December 2000, and $13 in June 2001. It is natural to ask if such valuations make sense and if so, to what extent can one rely on the valuation by analysts? In this paper, we attempt to address these problems where possible we shall use Amazon.com as an example to illustrate.
TRADITIONAL APPROACH OF VALUATION

The value of any asset lies in its future economic benefits and thus is a function of the cash flows generated by that asset, the life of the asset, the expected growth in the cash flows and the risks associated with the cash flows. Typically, the discounted cash flow approach (DCF) is often used: value of an asset = \( \sum PV(\text{Cash Flows}) \), see e.g. or Brealey and Meyer (2000) and Palepu et al. (2000) for more details.

There are a number of ways to apply the discounted cash flow approach. The free cash flow (FCF) model is the most widely used in practice. The economic profit model is gaining in popularity. Its advantage is that it highlights whether a company is earning its cost of capital. It is important to point out that both models result in exactly the same value, so the choice is mostly driven by the instincts of the user. The adjusted present value model and the equity discounted cash flow method are particularly useful in special situations. For examples, the equity DCF model is best suited for financial institutions such as banks and companies. The APV model is helpful for valuing companies with changing capital structures, such as leveraged buyout targets. These two models also give the same result as the FCF model. The key for applying these models is forecasting the cash flows.

THE VALIDITY OF THE DCF MODELS IN VALUING DOT.COMS

The DCF models are simpler when valuing firms with positive earnings, a long history of performance and a large number of comparable firms. However, Internet companies typically do not satisfy these conditions. High P/E ratio of Internet companies (300 or even higher) is out of proportion of any wild expectation. In particular, such high P/E ratio is usually associated with negative and declining profit of Internet companies due to the tendency of free provision of increasingly more Internet services. The economic mechanism of this phenomenon poses a great challenge to the traditional valuation approach. There are common difficulties in applying the valuation models to Internet companies (to be discussed later).

During the hey days of Internet companies, the prices of dot.coms were so high that many investors and analysts questioned the validity of traditional valuation approach for dot.coms. On the other hand, Many academics and specialists, see e.g. Copeland et al (2000), and Damodaran (2000), argued that the traditional approach with some modifications can be used to value dot.coms.

According to Shuttleworth (2000), some researchers confirmed that there was no correlation between an Internet company’s bottom-line net income and its stock price. However, they did find that individual income statement line items, in particular gross profits (defined as gross revenue minus cost of revenue), did have an affect on prices. This implies that DCF models may well be relevant to the valuation of dot.coms.

The recent Internet market plunge has clearly demonstrated that most Internet companies were far overpriced in early 2000. This implies the gap between valuation results and market values of dot.coms was, to a great extent, due to the speculative bubbles. Thus DCF valuation results might be close to the ‘true values’ of the dot.coms and they did make sense.

By now, it should be clear to the public that Internet is no King Midas. Business ideas related with Internet must be analyzed with the same vigour as any other business initiatives. However, the credibility of each valuation is highly dependent to the validity of its assumptions. This certainly applies to valuing Internet companies. The same approach does apply on valuing dot.coms, though some adaptations may be necessary and such companies are typically more difficult to value than companies in the ‘old economy’.
COMMON DIFFICULTIES IN VALUING DOT.COMS

In applying the traditional approach, analysts often encounter three problems with dot.coms: Negative earnings, absence of historical data and absence of comparable firms, as discussed in Damodaran (2000).

The basic problem with valuing firms with negative earnings is that projections cannot be based upon a base number that is negative. There are three options available to an analyst valuing a firm with negative earnings: normalize earnings, revenue/margin projections, or adjust leverage. Besides, the tax computation becomes more complicated with such firms and the normal going-concern assumption may be invalid.

In valuation, we often use data from years prior to the current year to estimate inputs more precisely. Due to the lack of historical data for dot.coms, it is often hard to estimate the betas and other variables such as working capital which vary significantly from year to year.

In addition, analysts also use information on comparable firms frequently in valuation. Thus the betas of a firm may be estimated by looking at firms of similar size in the same business. Estimates of capital expenditure requirements and working capital needs are often based upon the averages for comparable firms in the same business.

In considering the last two problems, it should be noticed that these two sources of information – historical data on the firm being valued and contemporaneous data on comparable firms – can substitute for each other. In other words, valuing a firm with limited history can be made much easier by the presence of a significant number of established firms in the same line of business. To a lesser extent, having a long history of information on the firms in the same line of business may compensate for the absence of comparable firms.

Apart from these problems, the Internet industry is very volatile and at an early growth stage. Typically, the growth of dot.coms can vary enormously from year to year. For example, Amazon posted growth rates in revenues of 800% from 1996 to 1997 and then another 400% from 1997 to 1998, and has also made a transition from being a book retailer to a specialty retailer. Such instability in growth also adds extra difficulty in estimating the future revenues and cash flows.

In general, the value of any firm can be decomposed into two components: value of assets in place and value of growth potential. For Internet companies, almost all of the value can be attributed to the second component. Hence the firm value is almost completely determined by assumptions about the latter.

In short, it should be noted that valuations of dot.coms are always subject to much more uncertainties than for firms in the 'old economy'. Thus the valuation results for dot.coms should be taken as a rough estimate in most cases. This has been evidenced clearly by the recent market correction for Internet companies. As the Internet industry matures, the noise in valuation of dot.coms will become less and less.

ASSUMPTIONS AND VALUATION EXAMPLES

In this section, we look at some valuation examples for Amazon.com and the relevant valuation assumptions. The purpose here is to highlight the major issues involved in valuing dot.coms. For this purpose, it is sufficient to base our discussions on valuations done by other people, rather than carrying out our own valuation.
BACKGROUND OF AMAZON.COM

Amazon.com started to sell books on the Internet in July 1995. Its shares were first traded on the stock market in May 1997. Between May 1997 and December 1999, the value created by Amazon for its shareholders amounted to 34.56 billion dollars, which is equivalent to a period return of more than 7000%. This is in sharp contrast to the stock market (S&P500) yield of 61% during that period. However, its share price fell sharply in the past one and half years from its $106.7/share quoted on 10 December 1999 and its share is trading at about $13 only in June 2001.

In the one and half years from December 1999 to June 2001, the nature and structure of the business of Amazon.com did not change much. Thus the huge plummet of the share price of Amazon.com must be mainly due to market sentiment change, that is, speculative bubbles. The speculative bubbles are not a new phenomenon. An example is the railway bubbles. When the railways started building their lines, investors had tremendous expectations about these companies’ future growth, which led to a dramatic increase in their share prices. However what happened afterwards with the railway business showed that the share prices had been overvalued: the companies return was much lower than expected. It seems to be fair to say that there were bubbles in the share prices of Amazon.com in early 2000. Now the bubbles have burst, but it is hard to tell that if there is still bubbles left or the company is being underpriced in the market. Estimating the real equity value of Amazon.com remains tough.

VALUATION BY COPELAND ET AL. (2000)

As pointed out in Copeland et al. (2000), the best way of valuing Internet companies is to return to economic fundamentals with DCF approach, which makes the distinction between expensed and capitalised investment unimportant because accounting treatments do not affect cash flows. The absence of meaningful historical data and positive earnings to serve as the basis for price-to-earnings multiples also doesn’t matter, because the DCF approach relies solely on forecasts of performance and can easily capture the worth of valuation creating businesses that have several years of initial losses.

The DCF approach cannot eliminate the need to make difficult forecast, but it does address the problems of ultra-high growth rates and uncertainty in a coherent way. Copeland et al. proposed to start from a fixed point in the future and working back to the present, using probability-weighted scenarios to address high uncertainty in an explicit way, and exploiting classical analytical techniques to understand the underlying economics of these companies and to forecast their future performance.

To be more specific, Copeland et al. (2000) estimated the value of Amazon.com by assuming scenarios for 10 years, ordered from most optimistic to least optimistic. Scenario A corresponds to ‘suppose that Amazon is the next Wal-Mart’, 15% of book sales on the American market, 18% of music sales of the American market, success in the sale of new products and a good margin. Scenario B and C are midway between A and the most pessimistic scenario (D), which is defined as much lower shares of the book and music markets, little success with other markets and a smaller margin. The value of Amazon’s equity in 2000 is obtained as 79 billion dollars according to Scenario A and 3 billion according to Scenario D. These values are obtained by discounting the free cash flows. The next step is to allocate probability to each scenario: they assumed that 5% to the most optimistic, 25% to the most pessimistic and 35% to the midway scenarios. With these assumptions they obtained an equity value of $23 billion, that is, $66/share. The major results are summarised in Table1 below.
Table 1: Copeland et al.'s forecast and valuation for Amazon.com

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Sales in 2001 ($billion)</th>
<th>Margin of EBITA (%)</th>
<th>Equity Value in 2000 ($billion)</th>
<th>Probability (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Books</td>
<td>Music</td>
<td>Other</td>
<td>Total</td>
</tr>
<tr>
<td>Scenario A</td>
<td>24</td>
<td>13</td>
<td>48</td>
<td>85</td>
</tr>
<tr>
<td>Scenario B</td>
<td>20</td>
<td>9</td>
<td>31</td>
<td>60</td>
</tr>
<tr>
<td>Scenario C</td>
<td>16</td>
<td>6</td>
<td>19</td>
<td>41</td>
</tr>
<tr>
<td>Scenario D</td>
<td>7</td>
<td>5</td>
<td>5</td>
<td>17</td>
</tr>
</tbody>
</table>

It should be noted that the above offers only a rigorous description of what could happen. We can not credibly forecast 10 or more years of cash flows for a company like Amazon.com, neither can we tell the exact probabilities associated with each scenarios. Besides, the number of scenarios may be far more than the four considered above and the bankruptcy is not allocated with any probabilities. The purpose of such an estimate offers a way to understand the value of Internet companies rather than a precise estimate of the value which is not attainable given the huge uncertainties involved.

With the benefit of hindsight, the above estimate shows that Amazon.com was overvalued as its share was trading at around $100 dollars in early 2000. Thus such valuation does make sense if we take the subsequent abrupt fall of the share prices of Amazon.com into account! However, the credibility of this estimate is quite limited as the current share price of Amazon.com is trading far from the equity value obtained above. It is impossible to know what the real equity value of Amazon.com should be, but it appears to be reasonable to say that the company was far overpriced by the market in early 2000, mainly due to the market sentiment.

### VALUATION BY DAMODARAN (2000)

Damodaran (2000) published a valuation of Amazon in March 2000 and valued its equity at 11.955 billion dollars, that is $35/share. The valuation is a simple discount of the FCF at the weighted average cost of capital. From this quantity, the debt and the value of the options held by the employees are deducted to obtain equity’s value. The major forecasts are listed in Table 2 below.

Table 2: Damodaran’s forecasts & valuation of Amazon.com (in Smillions)

<table>
<thead>
<tr>
<th>Sales</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBIT</td>
<td>-373</td>
<td>-94</td>
<td>407</td>
<td>1038</td>
<td>1628</td>
<td>2212</td>
<td>2768</td>
<td>3261</td>
<td>3646</td>
<td>3883</td>
</tr>
<tr>
<td>Taxes</td>
<td>0</td>
<td>0</td>
<td>167</td>
<td>570</td>
<td>774</td>
<td>969</td>
<td>1141</td>
<td>1276</td>
<td>1359</td>
<td></td>
</tr>
<tr>
<td>Depreciation</td>
<td>46</td>
<td>60</td>
<td>75</td>
<td>90</td>
<td>104</td>
<td>115</td>
<td>122</td>
<td>130</td>
<td>138</td>
<td>146</td>
</tr>
<tr>
<td>Capital expenditure</td>
<td>554</td>
<td>907</td>
<td>1345</td>
<td>1572</td>
<td>1438</td>
<td>1572</td>
<td>1599</td>
<td>1489</td>
<td>1226</td>
<td>815</td>
</tr>
<tr>
<td>WC expenditure</td>
<td>50</td>
<td>84</td>
<td>126</td>
<td>147</td>
<td>132</td>
<td>144</td>
<td>146</td>
<td>134</td>
<td>108</td>
<td>66</td>
</tr>
<tr>
<td>FCF</td>
<td>-931</td>
<td>-1024</td>
<td>-989</td>
<td>-758</td>
<td>-408</td>
<td>-163</td>
<td>177</td>
<td>625</td>
<td>1174</td>
<td>1788</td>
</tr>
<tr>
<td>Kc(%)</td>
<td>12.9</td>
<td>12.9</td>
<td>12.9</td>
<td>12.9</td>
<td>12.9</td>
<td>12.42</td>
<td>11.94</td>
<td>11.46</td>
<td>10.98</td>
<td>10.50</td>
</tr>
<tr>
<td>Kd(%)</td>
<td>8.0</td>
<td>8.0</td>
<td>8.0</td>
<td>8.0</td>
<td>8.0</td>
<td>7.8</td>
<td>7.8</td>
<td>7.7</td>
<td>7.5</td>
<td>7.0</td>
</tr>
</tbody>
</table>

As can be seen from the above table, many assumptions regarding the sales growth, cost of capitals etc. need to be made. In making these assumptions, all the difficulties analysed in the previous section need to be carefully considered.

For example, let us look at the assumptions on the revenue growth. The revenue growth rate of Amazon.com is 800% from 1996 to 1997 and 400% from 1997 to 1998. But such growth rate is not sustainable according to common sense (see e.g. Palepu et al. (2000)). It appears reasonable to allow the continuing momentum of high growth and assume that the growth rate will decreases to reach a stable rate of 6% in 10 years time. Obviously the assumption of growth rate does have an important impact to the quality of the final valuation result. But which growth rate to pick up is more like an art rather than a science. Thus the common sense is often called upon. A sensitivity analysis will be highly desirable if one need to have a clear picture of the firm’s value.
In estimating the risk parameters, the traditional regression approach can not be taken as the historical data is very limited. Instead, the risk parameters here have to be estimated using the financial characteristics of the firm—the volatility in earnings, its size, cash flow characteristics and financial leverage. These risk parameters should not be left unchanged over the estimation period. As the firm matures and moves towards its sustainable margin and the stable growth, the risk parameters should also approach those of an average firm. In contrast to the regression approach, this approach is far more complicated and much harder to achieve. At the mean time, inevitably there will be more noise in the estimated risk parameters. This shows why the valuations for dot.coms are typically more difficult and subject to more noise.

It should be noticed that eventually, the forecast quality is really dependent on these assumptions. To ensure that the final valuation figure makes sense, each of these assumptions should be based on logical arguments and reasoning, especially they must be consistent with common sense in business. In understanding the final valuation figure, one also should have the assumptions in mind.

CONCLUSIONS

As the emergence of the Internet and related technologies led to tremendous value creation for select entrepreneurs, it also raised questions about the sanity of a stock market that appeared to value companies more, the greater the losses they generated. It is argued that the traditional DCF approach, with some adaptations, is an essential tool for understanding the value of these companies. The recent Internet market correction has taught us that valuation results for dot.coms should be treated with care and should be well understood by looking into the valuation procedure and assumptions. The sentiment of markets has had a severe impact on the market values of dot.coms. Due to the complexity, lack of comparisons, and great number of future uncertainties involved, there are inevitably more noises in the valuations of dot.coms than firms in the ‘old economy’. As the Internet industry matures, the DCF approach will be easier and easier to apply and the noises in the estimates will be further reduced.
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A decision support framework for manufacturing subcontractor selection

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ABSTRACT

Virtual enterprise is viewed as an effective solution to fulfill the requirements of today's global market. One common key issue in designing virtual enterprise is subcontractor selection. In this paper, the factors affecting the subcontractor selection process are divided into two categories: hard factors and soft factors. Accordingly, a two-phase framework is designed to assist the decision making process in selecting efficient and compatible subcontractors. Phase 1 mainly considers that whether subcontractor candidates can offer certain products or services in time with high quality and low price; phase 2 concentrates on the cooperation potentiality of subcontractor candidates.

Keywords: decision support, subcontractor selection, virtual enterprise

INTRODUCTION

Background

Global market of today demands rapid introduction of products while maintaining high quality and minimal costs. However, single enterprise has limited resource and capability while products become more complex and technology updates rapidly. It is a monumental task for large or small companies to accomplish all the aforementioned goals in a timely and efficient manner. Large companies are often very complex and slow to change, while small ones suffer from a scarcity of resources.

In such scenarios, virtual enterprises (VE), dynamic enterprise alliances (DEA), and value chain networks (VCN) are envisioned by many experts as efficient solutions for rapid introduction of a variety of products while maintaining high quality and low costs (Iacocca Institute 1991, Talluri et al. 1999, Chen et al. 2000, Lau et al. 2001). Because they are interchangeable on some extent, these terms are considered as the same thing in this paper.
A virtual enterprise is a dynamic organization of collaborating enterprise partners brought together by information technology, in particular, the Internet. It re-organizes manpower, technologies, and other resources distributed in different enterprises to fulfill specific market requirements. A Virtual Enterprise is formed in the event of a market opportunity and is dissolved when the opportunity passes. Different views demonstrate the solution of virtual enterprise in Figure 1.

![Diagram of virtual enterprise solution](image)

**Figure 1: The solution of virtual enterprise**

Generally, virtual enterprises can be divided into three types by level of outsourcing: internal, stable, and dynamic (Snow et al. 1992). In internal virtual enterprise, firms own most of their assets and have limited exposure to outsourcing. A stable virtual enterprise engages in a moderate level of outsourcing. And usually, in this kind of virtual enterprise, a set of suppliers supports a 'lead' company. Dynamic virtual enterprises are formed by a group of independent companies. The lead company, acting somewhat as a broker, identifies potential partners who own a large or sometimes the entire portion of the assets in the virtual enterprise.

In a virtual enterprise environment, an industrial project is usually divided into subprojects and outsourced to subcontractors (e.g. suppliers and service providers). The subcontractors may further outsource their tasks to their subcontractors. These subcontractors are members of an alliance. They keep independent business processes and contribute 'core competencies' in areas, such as design, manufacturing, and distribution, etc. to the virtual enterprise. Figure 2 shows the relationship among members of virtual enterprise.
It is clear that virtual enterprise will not exist without somebody to initiate it. So in such a virtual enterprise, one or several members must play the role of initiator(s) and manager(s) in leading the collaboration.

One common key issue in designing this new form of organizations is the subcontractor selection process. Subcontractor selection investigates the principles and mechanism in selecting subcontractors in an open marketplace. Although some work has been done in this area, practical mathematical models and optimization methods for subcontractor selection are still a challenge. Much of previous research emphasizes conceptual and empirical decision support models. They may suffer from one or more shortcomings such as being mathematically too complex, too subjective, etc. (Holt at al. 1998). What practitioners need is a methodology that is simple to use and understand, and yet produces reasonably accurate results (Huang G.Q. et al. 2000).

**Difficulties, complexity, and solution**

When a selector, such as a broker, tries to find a set of subcontractors to meet particular requirements, it will encounter difficulties as below.

It is difficult to evaluate all the factors that will affect subcontractor selection as a whole. There are many factors to consider in making the selection, some of them are qualitative, such as friendship, credit, and reliability; as while as others are quantitative, such as cost and completion time. And there will be different sets of factors for different kinds of subcontractors. For example, a manufacturer candidate should have suitable machines, as while as a seller candidate should have suitable marketing channels.

It is an extremely tedious and time-consuming process to evaluate each combination of subcontractors and identify the most desirable one from them (Talluri et al. 1999). For example, consider a situation in which a virtual enterprise with four types of business processes A, B, C, and D is to be formed. If there are 5 potential candidates for role A, 6 for role B, 7 for role C, and 8 for role D. Then the total number of combinations under consideration is 1680 if these different roles of subcontractors are correlative.

A broker or initiator usually receives overload information about selection of subcontractors (Ho et al. 2000). Before make the decision to form a virtual enterprise, exhaustive efforts must be made to remove.

To address the problems above, this paper proposes and introduces a decision support framework, which can assist selectors to find an efficient and compatible set of subcontractors.

In this framework, the factors affecting the subcontractor selection are divided into two categories - hard factors and soft factors. Accordingly, a two-phase decision model is proposed. Phase 1 mainly considers that whether candidates can offer certain products or services in time with high quality and low price; whereas, phase 2 concentrates on the cooperation potentiality of candidates.
The main body of this paper is divided into four parts. The first part explains the framework and architecture as a whole. The second part introduces how to define specifications for evaluation and selection. The next part discusses hard factors evaluation, followed by soft factors evaluation.

**FRAMEWORK OVERVIEW**

For common evaluation and selection problem, when jobs or tasks are coming, the selector should take general procedure as below:

(a) Defines specifications (task requirements), which include factors and their targets;
(b) Collects related data and information from subcontractor candidates;
(c) Evaluates and select the suitable set of subcontractors.

However, as mentioned above, there are many factors to consider in making the subcontractor selection. Some of them are qualitative, and others are quantitative. Consequently, these factors are divided into two categories. One is called hard factor, which includes those concrete, certain, and local factors (such as machine, price, and delivery time for certain products). Another is named soft factor, which includes those abstract, generalized, and global factors (e.g. product, people, technology, management and marketing related factors).

![Hard factor and its target](image)

![Soft factor without clear target](image)

![Hard decision](image)

![Soft decision](image)

Figure 3-a: Hard factor and its target
Figure 3-b: Soft factor without clear target

Figure 4: Task flow of the framework
Hard factors have exact targets, like Figure 3-a. A candidate will have advantage when it can satisfy those targets or be closer to them. Oppositely, soft factors have some fuzziness, because it’s difficult to set an exact target for each soft factor. It is like Figure 3-b.

Accordingly, a two-phase framework is proposed. Phase 1, named hard decision, mainly considers that whether candidates can offer certain products or services in time with high quality and low price; whereas, phase 2, named soft decision, concentrates on the cooperation potentiality of candidates.

The basic function and task flow of this framework are defined as Figure 4. In which, the input of the system - ‘Job’, means a part or a component to be outsourced to the manufacturing subcontractor. In hard decision, a short list is identified from all the candidates. And in soft decision, a final recommended list is generated. By this method, the specifications become clearer, and the whole selection process becomes simpler.

In the whole selection process, there is a great deal of information interchange between the selector and candidates. And the information flow and process between the selector and each candidate is defined in Figure 5. There are five steps in the procedure.

![Figure 5: Information flow between selector and candidate](image)

The selector prepares and defines hard and soft specifications (each includes factors and their targets), then publish the information about the task and hard factors to potential sub-contractors.

If a company that received the above information is interest in the job, it can submit related data according to hard specification to enter the initial candidate list. The data submitted here is called hard data.

The selector collects the data and evaluates it to identify the retrial candidate list, to which the soft factors will be sent.

- (d) The candidate on the retrial list submits soft data, relative data according to soft specification.
- (e) The selector collects the data and evaluates it to generate the final preferred candidate list.

A prototype framework system for manufacturing sub-contractor selection has been developed on the initial round of investigation, the architecture of which is showed as Figure 6. The framework is composed of five tiers, which are:

- **Interface tier**, with which users (domain experts and decision maker) can communicate with the system.
- **Function tier** includes three main functions of the system: Specification definition, hard decision, and soft decision. The next several parts of this paper describe them in detail.
- **Tool tier** includes four groups of tools. The decision support group is the most important one. The reasoner is an inference engine, by which the system can draw conclusion from facts and knowledge. For example, given part information, the process method can be retrieved from method base. As while as, given process method, machine tool can be found from tool base. The matcher is called by hard decision to evaluate whether a candidate has the capabilities to complete the task. The fuzzy mapper is called by soft decision to evaluate the performance of a candidate on soft factors.
- **Data tier** includes database (such as task base to store information about details of task, factor base to store information about factors and their targets) and knowledge base (such as method base that stores knowledge about process method for certain task, tool base that stores knowledge about machine tool for certain process method).
- **Base tier** includes an integrated 3-level model (Huang X.G. 2000) for information (includes data and knowledge). The first level is a relational model to store information; the second is an Information Set Model...
(ISM) model to describe information; the third includes several application models to fulfill different requirements of certain information objects.

Because of the length of the paper, only principles and theories of core functions: Specification definition, hard decision, and soft decision will be introduced here.

![Architecture of the system](image)

**Figure 6: Architecture of the system**
**SPECIFICATION DEFINITION**

**Hard specification definition**

This step is to define all the factors, and set their targets and maybe weights in some situation.

As introduced above, hard decision is to determine that whether a candidate has the capacity to offer certain products or services in time with high quality and low price. Thus, the hard specification should include factors about time, price, and quality. And quality of a certain part or component can be divided into detail technique specifications, which are generally offered by the designer of the product.

**Factors may take different types of values.**

Low-pass. Some factors are of the type ‘the smaller is the better’. For example, it’s better if the price is lower, and deliver date is earlier.

High-pass. Some factors are of the type ‘the larger is the better’. For example, it’s better if the product has longer life expectancy.

Middle-pass. Some factors are of the type ‘the middle is the better’. For example, it’s better if the real size of a dimension is just between the upper and limitations of tolerance.

Some factors are of the Boolean type. For example, if the subcontractor has certain equipment or technology to complete the job.

And some time, it needs to consider about the importance of different factors. This system offers five grades for the importance of factors, and the grade increases from 1 to 5. Domain experts or selector can set the grade for each factor.

**Soft specification definition**

Soft decision concentrates on the cooperation potentiality and long term relationship between selector and subcontractor, and soft factors are those abstract, generalized, and global factors. As a result, it is difficult to set exact targets for soft factors. This step needs to define soft factors and set their weights.

A hierarchical tree model is used to describe soft factors, and Figure 7 is such an example. There are five main soft factors in this example, which are product, facility, technology, personnel, and management. These factors can be continually decomposed into sub-factors, and all the factors make up of a factor tree. In this tree, the factors are called leaf nodes if they can be given quantificational evaluation directly and need not further decomposition; otherwise they are called branch nodes. This tree model can describe the soft factors subcontractors clearly, and be easily enlarged and modified. It should be noted that the factor tree might be different in different cases. It is up to the selector.

![Figure 7: Example of soft factor tree](image)

All the leaf-nodes need weights, which can be acquired according to the method of hard specification definition.
HARD DECISION

Single factor evaluation

In hard decision, hard factors are evaluated on the basis of targets (includes stands for the requirements of selector) and candidates' data (stands for the capabilities of candidates). Selector's requirements and candidates' capabilities may overlap. A candidate may have surplus or shortage of capability to meet the selector's requirements. And as mentioned above, the value of facts may be four types. This paper proposes four membership functions (He 1983) to describe the extent whether selector's requirements match candidates' capabilities. For reader's convenience, a list of notations is given here.

\[ x \] the data of a candidate on one factor.
\[ a \] the target of the factor.
\[ b \] relaxation coefficient, \( b > 0 \).
\[ \mu(x) \] membership function

High-pass (showed as Figure 8-a)

\[
\mu(x) = \begin{cases} 
  e^{\frac{x-a}{b}} & (x < a) \\
  1 & (x \geq a)
\end{cases}
\] (1)
On this kind of factors, a candidate will get better assessment score if his data is higher. However his score will reach ceil at the point of target, and will not increase after then.

\[ \mu(x) = \begin{cases} 
1 & (x \leq a) \\
\frac{e^{-\frac{x-a}{b}}}{x > a} & (x > a)
\end{cases} \]  

(2)

On this kind of factors, a candidate will get better assessment score if his data is lower. However his score will reach floor at the point of target, and will not decrease after then.

Low-pass (showed as Fig. 8-b)

\begin{align*}
\mu(x) & = \begin{cases} 
1 & (x \leq a) \\
\frac{e^{-\frac{(x-a)}{b}}}{x > a}
\end{cases} \\
\end{align*}

Mid-pass (showed as Fig. 8-c)

\begin{align*}
\mu(x) & = \begin{cases} 
\frac{e^{-\frac{(x-a_1)}{b}}}{x < a_1} & (x < a_1) \\
1 & a_1 \leq x \leq a_2 \\
\frac{e^{-\frac{(x-a_2)}{b}}}{x > a_2}
\end{cases} \\
\end{align*}

(3)

On this kind of factors, a candidate will get better assessment score if his data is closer to the middle of the target range. However his score will reach ceil if his data is within the range.

Boolean

In fact, this type is a particular case of type c (while \( b >> x \))
Overall evaluation

There are two steps.

(a) Get weights for hard factors from importance grades by

\[ w_i = \frac{g_i}{\sum_{i=1}^{m} g_i} \]  (4)

Where,

- \( m \) the number of hard factors
- \( g_i \) the importance grade of a factor
- \( w_i \) the weight of a factor

(b) Get overall hard factor evaluation score by

\[ E_h = \sum_{i=1}^{m} w_i \mu_i(x_i) \]  (5)

Based on the result of hard factor evaluation, the selector can choose a proper number of candidates for retrial list.

**SOFT DECISION**

![Tree data structure](image)

Figure 9: Tree data structure

A soft factor tree can be abstracted to a tree data structure (Xu 1996) as Fig. 9-a, and the data of every candidate make up a 2.5D forest as Figure 9-b.

Leaf node evaluation

Because soft factors are qualitative, a measure of fitness is used to quantify them by

\[ r_{ij} = \frac{s_{ij}}{\sum_{j=1}^{n} s_{ij}} \]  (6)

Where,

- \( i \) the index of factors
- \( j \) the index of candidates
- \( n \) the number of candidates
- \( s_{ij} \) the initial score of candidate \( j \) at node \( i \) given by domain experts or selector, from 1 to 5.
- \( r_{ij} \) the fitness rank of candidate \( j \) at node \( i \).
Branch node evaluation

For a branch node, if it's every child node has a fitness rank, the evaluation score of this branch node can be gotten by fuzzy mapping.

\[
(e_1, e_2, \ldots, e_n) = (w_1, w_2, \ldots, w_m)
\]

Where,

- \(m\) the number of factors
- \(w_i\) the weight of a factor

**OVERALL EVALUATION**

The step-by-step procedure is described in brief as follows:

(a) Set root node as current node.
(b) Check whether all of its child nodes have fitness ranks.
(c) If one of its child nodes has not rank, take the child node as current node, call step (a) recursively.
(d) Get weights of its child nodes.
(e) Get evaluation score of current node by fuzzy mapping
(f) Return the evaluation score as fitness rank.

**CONCLUSIONS**

The work on the subcontractor selection problem of virtual enterprise leads to the following conclusions:

A two-phase framework is outlined from which a selector can get decision support when it seeks efficient and compatible subcontractors. Dividing selection-related factors into two categories provides a way to simplify and shorten the whole decision process.

To describe all the factors clearly, a four-type model is defined to describe hard factors, and a tree model is designed to describe soft factors.

Membership functions are developed to quantify hard factors, as while as a fuzzy mapping-based algorithm is developed to quantify soft factors.
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Investigating Educational Web Services: A Quantitative Review of 100 International University Sites

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ABSTRACT

The purpose of this research is to evaluate publicly available university Web sites and to classify those sites according to automatically generated profiles. Recent studies offer important insights about the state of the art of university Web sites and the future needs of Internet-based information services in higher education. Most of them, however, do not systematically explore the differences regarding structure and content of the observed systems. Our paper presents the findings of a study that comprises a sample of 100 international university Web sites. It investigates empirical differences and identifies explanatory factors for these differences. The study relies on empirical Web data as of May 2001.

Keywords: Higher Education, University Web Sites, Evaluation, Fortune Global 500, Comparative Analysis

INTRODUCTION

Dominating much of the Internet's history, universities have been actively pushing and developing related technologies until the beginning of the 1990s. In the mid 1990s, however, companies discovered public networks as a commercial opportunity. Together with the rapid development of desktop computers, communication infrastructure and graphical Web interfaces, the unprecedented growth of the World Wide Web began. Commercial organizations started to be the drivers of Internet technologies that were no longer exclusively used by academics. These mass-market technologies have been actively shaped by their commercial applications. How are they implemented and used by the academic sector? Currently, universities are putting a lot of effort into developing Web-based instructional approaches and knowledge brokerage platforms (dSPACE 2001; Brantner et al., 2001; Vrabic and Simon, 2001) or into deploying Internet-based administration services. This paper represents a first step towards an analysis of how and why university sites differ from each other and how they differ from commercially oriented sites.
METHODOLOGY

There are several approaches to classifying Web information systems. Generally, they can be divided into manual and automatic methods. In this paper we will use an automatic approach to classify and evaluate publicly available sites.

Automatic Web evaluation methods are more efficient and immune to intra- and interpersonal variances than manual evaluation and provide the opportunity to analyse a large number of sites in a relatively short period of time. Naturally, these advantages come at the expense of sacrificing non-quantifiable, frequently recipient-dependent information (Bauer and Scharl, 2000). The methodology and classifications presented in this paper are based on the five factors: Interactivity, Navigation, Security, Layout, and Textual Content. Considering technical feasibility, these factors, which are characterized by varying degrees of measurability, evolved from reviewing previous approaches and exploratory case studies. They will be discussed in the following sections. A detailed description of the variables can be found in (Scharl, 2000).

Sampling Process

For the analyses presented in this paper, a combination of purposive and stratified sampling was chosen. Purposive samples are based on expert judgments and pre-specified criteria. Stratification identifies sub-populations, or strata, and then selects objects for sampling within these sub-populations. The combined sample underlying this paper comprises 100 Web-based information systems of universities, divided into sub-populations by geographic region: North America, Europe, Asia, Australia & New Zealand, Mid- & South America, and Africa.

Data Gathering and Extraction

A Linux-based architecture was used to mirror the data. This study concentrates on the primary user interface and does not consider password-protected areas. Thus the downloading limit of the mirroring process was set to 10 MB per site. Upon successful completion of the mirroring process, the retrieved files including event-log and error-log were archived for further processing. A mirroring limit of ten megabytes of textual data (excluding graphics and other multimedia files) was set for a better comparison of sites of heterogeneous size. To extract the information from the mirrored data, a Perl script was used to parse the HTML files of the mirrored Web sites and compute the variables for the classification. During the parsing process the HTML code was searched for markup tags to establish the values for the predefined parameters. The variables total number of images and distinct number of images, for example, are derived from the occurrences and attributes of the <IMG>-tag. Each occurrence of the tag increments the total number of images, while the distinct number of images is only increased when an image occurs for the first time as indicated by the graphical resource’s URL in the SRC attribute of the <IMG> markup tag.

Similarly, the variables referring to external and internal links are calculated by counting the <A> markup tags. A more detailed analysis of the URL in the HREF attribute distinguishes between relative, absolute, and external links. Additionally, the script produced a single text file from the mirrored documents, which was stripped from the structural HTML markup and stored in plain ASCII format, which served as input for an exploratory textual analysis. Variables for each Web site were assembled into a single vector, producing a two-dimensional matrix for the sample of 100 university Web sites.
ANALYSIS OF DATA

The extracted raw information needed to undergo further analysis to associate semantic meaning. In order to analyses the data of the university sample we first identified outliers and tried to assess whether they were real outliers or errors. Since many statistical methods are based on the assumption of normal distribution, we also analysed the pattern of distribution of our variables. Unfortunately, many of our variables proved to be far from being normally distributed or symmetric, even after transformation. Facing the problem of normality, comparing means of our variables classified by regions proved to be very difficult. The distribution between regions differs widely from normal and the spread of the distribution within the groups vary greatly (violation of the assumption of equal variances). We used boxplots to identify skewed distributions and identify different spreads across groups.

Interactive Features of University Data

We measure interactivity with four groups of variables: Email, Script, Applet and Form. The first variable establishes the number of direct links to distinct email addresses referenced through <A HREF="mailto:...">. Script represents the number of occurrences of the <SCRIPT> tag per document. Applet counts the number of distinct java applets as determined through the reference to its class file. Form indicates the number of forms with distinct action attributes.

![Figure 1: Comparing the level of interactivity (standardized mean values)](image)

Analysing regional differences shown in Figure 1 we were surprised that the average interactivity values of the European sample were much lower than the values for North America. Having visited the Web sites we had already assumed that, on first sight, the European sample was less homogeneous than the samples of the other regions. Using box-plot analysis and percentiles we identified that the spread of the European sample was bigger for most variables than for all other regions. Having a de-tailed look on the outliers at the lower end it made sense to divide the heterogeneous European sample into two subgroups: Western European countries and Eastern European countries. The chart in Figure 2 demonstrates how the split of the European sample affects the average values for Western Europe.
Comparing the average university sample to the Fortune Global 500 values shows higher average values of the Form variable for the Fortune 500 companies than for the university sample. In terms of interactivity, this result shows us that commercial Web sites have a higher focus on interacting with their stakeholders via forms – e.g., customers requesting brochures, ordering online, registration forms of all kind, feedback forms, etc. The university sample shows higher average values for Applet tags whereas the number of Script tags is lower compared to the Fortune 500 sample. We conclude that many commercial Web sites use the scripts for layout purposes and to ensure a consistent corporate identity. The Mail variable is clearly higher in the university sample than in the Fortune 500 sample, due to the fact that university Web sites refer to the email addresses of all staff and students. Commercial Web sites and large corporations in particular tend not to put all email addresses of employees on their sites.

1.0

DISCUSSION AND OUTLOOK

This report on our work in progress concentrated on one factor, the level of interactivity. There are certain limitations in analysing Websites automatically since it is not possible to analyse pages in password-protected areas. Nevertheless the primary user interface does provide sufficient information to make statements on the general level of interactivity. Further research will also investigate and compare other criteria outlined above (navigation, security, layout, textual content).

In addition to comparing individual statistical criteria, we used cluster analysis to identify homogeneous subgroups based on selected characteristics. Clustering our current sample proved to be very difficult. We will therefore expand our sample and concentrate on few countries, trying to identify other factors than regional differences. Analysing the linear relationship between our variables and additional university data (university budget per student, number of students, number of staff, IT budget, type of funding, type of university, etc.) will help us explore additional explanatory factors for the differences in structure and content of university Web sites. We will then construct a roadmap for further investigations and to derive recommendations for both Web developers and university management.

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Constituent Market Orientation and Virtual Organisations

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ABSTRACT

This paper applies the understandings about Constituent Market Orientation gained by research undertaken by Tellefsen to the six organisational types of the taxonometric model of Virtual Organisation developed in the School of Management Information Systems at Edith Cowan University to identify the most effective distribution of resources and management attention in combinations of real and virtual e-business scenarios.

Keywords: Virtual, e-Business, Management, Learning, Theory, Markets, Orientation

INTRODUCTION

When constructing a business solution, many constituencies and stakeholders determine the idea’s market value, effectiveness, and efficiency. These include labour markets, downstream markets, collaborative markets, upstream markets including suppliers, market regulators such as industry associations, governments, and general influencers like the media and the public. Market oriented leaders direct their attention and efforts towards these constituent markets to maximise a business unit's competitiveness. In total, the above distribution of attention forms the ‘constituent market orientation’ of an organisation.

Tellefsen (1995, 1999) has undertaken extensive research justifying a top management led programmatic and natural learning based on feedback from the constituents (‘market-back’) theory of Constituent Market Orientation. The research findings are based on information provided by 235 CEOs, 244 market managers, 188 purchasing managers, 163 personnel managers, 179 union representatives, 154 PR managers, and 175 lobbying managers. Tellefsen's original hypotheses were aimed at conventional larger organisations. His findings, however, indicated that this Constituent Market Orientation theory is applicable more broadly.

This paper applies Tellefsen’s Constituent Market Orientation theories and findings to the forms of virtual organisations commonplace in the e-commerce arena categorised in terms of the taxonometric model developed at the School of Management Information Systems, Edith Cowan University (see, for example, Burn and Barnett, 1999, Burn et al., 1999, Burn and Tetteh, 2000, Lethbridge, 2001, Marshall et al., 2001).
OVERVIEW OF TELLEFSEN'S CONSTITUENT MARKET ORIENTATION FINDINGS

Market orientation is essentially a theory of market-driven organizational learning and innovation. An individual learns through interacting with its environment. The closer the interaction with a particular part of the environment, the more the individual learns about that part. If an individual has no direct interaction with a part of his or her environment, that part will become unknown and invisible. Commonly, the constituent market orientation of an individual becomes unbalanced and results in increased focus on some constituents and partial ignorance of other constituents.

The configuration of an individual’s group membership is the most important factor in their orientation. We are social beings. Intense learning occurs primarily in face-to-face groups. Groups with frequent contacts and internal double and triple-loop learning establish a strong culture with common beliefs, values, goals, priorities, language, habits and recognition patterns. In larger group contexts, they form a sub-culture. The number, type and heterogeneity of an individual’s cultural traits (often referred to as the individual’s personality) depends on the number and type of social groups he or she belongs to. Each individual's consciousness is limited, tending to routinize behavior, and result in focusing on a limited set of social relations. When an individual is preoccupied with something — due to habits or previous learning of beliefs, values, priorities and goals — other things are unattended, invisible or not comprehended.

Crossan et al (1999) say the same limitations apply to groups sharing mental frames, paradigms, observations and experiences. These limitations, combined with group wise double-loop learning; result in many groups developing distinct sub-cultures that are often homogenous and stable. These factors interact with other organisational, management and leadership factors in significant ways. An organization institutionalizes what tasks are to be carried out by whom, who works with whom, and the rules and intensity of interactions. The nature and structure of the institutionalization has a profound impact on the emergence of distinct sub-cultures within industrial clusters, networks of cooperating firms, single firms, and inter- and intra-organizational workgroups. The tighter group-internal relations are, and the looser the group-external relations are, the stronger the sub-cultures of individual groups become.

Organizations that consist of heterogeneous groups with strong sub-cultures become extremely difficult to govern and lead. Common language, perceptions, values, experiences, goals and habits are weak. Performance and behavior become unpredictable for the organization as a whole, and the organization will not be able to develop a common identity and image. The challenge to the leadership, therefore, is to establish learning loops that are programmatic and led from the center of power. The purpose of these programmatic learning loops, is to establish common purpose, values, and objectives. They must also result in, a common understanding of language, facts, and the environment, with its internal processes and structure, constituents and stakeholders. From a strategic point of view, it is also essential to establish definition between ‘us’ and ‘others’: the limits and borders of the organization and its competition. To establish a strong common culture in the organization, the common elements established by the leadership must be communicated to all members of the organization, and be implemented in all decisions regarding leadership style, organizational architecture, structures and processes, strategies, operations, services and products, and be reflected in all external communication with the constituents. An alternative, to this organizational approach to producing and exchanging values in the sub-groups of an organisation, is the market solution of distance and freedom of choice among the actors. Resource-based and agent-based theories of networks have explored the feasibility and economics of these alternatives: administrative versus market solutions of exchange (Conner, 1991, Dahlstrom and Nygaard, 1999, Heide, 1994).

Knowledge management is a key factor in the above issues (see, for example, Prusak, 1997). Learning theory distinguishes between tacit and explicit knowledge. Explicit knowledge can be communicated through a common language, which includes the meaning and feelings attached to body language, pictures, sound, and any form of symbols including written language. Knowledge can also be tacit, and this can occur at several levels: individual, work group, network, firm, industry, language group,
etc. In the context of e-business, a prerequisite for an e-based business solution is that knowledge received via an electronic network is explicit between the senders and the receivers. This implies that tacit knowledge cannot become part of the e-commerce systems interface with users, although it has a role in developing and understanding the non-visible parts of an e-commerce solution.

FOUR KEY PROCESSES IN BUSINESS IDEA IMPLEMENTATION

E-systems have advantages in generating and distributing data, but limitations in interpretation of the data necessary for generating learning that can lead to adaptive and generative innovation. E-networks, as system enablers for gathering and disseminating information, have limited usefulness in governance and leadership processes, and those exchange processes that involve physical products and services requiring problem-solving or the use of tacit knowledge. Tellefsen’s findings indicate that the leadership of an e-business therefore has to construct and manage four parallel systems in addition to the system for current operations. To establish and maintain a holistic business idea the leadership group needs to use:

The power system: Ownership that establishes who ‘we’ are, social legitimacy, authority to make decisions, risk-taking, the distribution of values gained and consumed (including financing of investments, distribution of revenues and costs, liquidity and profits)

Internal driving forces: Common beliefs, purpose, values and objectives of the organization

Strategy making processes: The processes and systems for developing organization-wide agreement on who ‘we’ are, our image, who we want to relate to and exchange values with (the stakeholders), who the ‘others’ are (competition and other constituents), how to compete (defining moral and wanted behavior) and with what (technology and know-how).

Operative management and systems: Management processes and procedures, including methods for task delegation, solving disputes, accountability, value production, value distribution, delegated risk-taking, Development and integration of real-world and virtual systems of operations.

How organization-internal factors influence the extent of market-driven learning, and how the resulting constituent market orientation influences various organizational outcomes is illustrated in figure 1.
Figure 1: A model of constituent orientation

**ANTECEDENTS**
Functional Managers  The CEO  All managers
Conflict/connectedness with  Risk taking, Reorientation Personal background
other functions, departments  Senior management signals
and hierarchy levels.  Relative priority of constituents

**CONSTITUENT ORIENTATION**
Functional Managers  Market orientation toward their own constituent measured as gathering, disseminating, and reacting on intelligence
The CEO  Market orientation towards all constituents.

**CONSTITUENT MODERATORS**
MODERATORS
Government
Lobbying competition intensity
The firm’s importance for the government
Regulation changes in the firm’s industry
Dependence on government decisions

Customers
Turbulence among customers
Competitive intensity among customers

 Suppliers
Turbulence among suppliers
Competitive intensity among suppliers
Differentiation between suppliers

Media
Turbulence among media
Competition to get into media
Availability of media
Media knowledge in the industry

Employees
Turbulence in the employment market
Employment competitive intensity
Negotiation power of employees
Negotiation power of union representatives
Government influence on relations

**ORGANIZATION**
The CEO
Generic strategic choice of the firm

Lobbying manager
Ability to influence top management

Marketing manager
Technological turbulence
Ability to influence top management
Centralization of marketing decisions

Purchasing manager
Time horizon for investments
Ability to influence top management

PR manager
Centralization of PR decisions
Ability to influence top management

Personnel manager
Turbulence among employees
Recruitment needs
Focus on retaining employees
Salary level
Centralization of personnel management
Ability to influence top management

**CONSEQUENCES OF THE ORIENTATIONS**
The CEO  Purchasing  Lobbying
Return on investment  Cooperation level  Increase in lobbying
Relative cost level  Relative purchasing costs  Influence on lobbying
Profit margins  Labor union support
Personnel
Employee loyalty  PR  Marketing
Employee compensation  Influence on 3rd parties  Customer loyalty
Customer effect  Information from media  Customer satisfaction
Level of ‘laissez-faire’  Market share
Level of trust  Marketing costs
Unionisation percentage  Profit margins
All e-commerce and ‘virtual’ organisations contain, in some form, the roles listed in Figure 1: just like any real-world organization. In addition to internal management factors, the history, culture and competitive climate of the industrial cluster influence the degree of market-driven learning that takes place within all members of a cluster. Three factors influence the profitability, and therefore the strength of market-driven learning towards each separate constituency:

The intensity of competition
The differentiability of the competing firms in the eyes of the constituents
The rate of change in the market place (turbulence in both the supply and the demand constellations in the market) (Tellefsen, 1995).

DIFFERENT FORMS OF VIRTUAL ORGANISATION

A ‘virtual organisation’ is a group of otherwise unconnected organisations that act together. Virtual organisations have adopted many forms. Research undertaken at the School of MIS, ECU has resulted in the identification of a six-element taxonomy of forms of virtual organisation (Burn and Barnett, 1999, Burn et al., 1999, Burn and Tetteh, 2000, Lethbridge, 2001, Marshall et al., 2001). These are:

Virtual Face
Star Alliance
Market Alliance
Co-Alliance
Value Alliance
Parallel Alliance

These classifications have been used by the authors for a number of different purposes in formulating theory and strategy in the development of e-business networks. They offer a useful way of structurally relating the spectrum of ‘virtual organisations’ to the underlying real organisations. This is the basis of the way that these models have been reworked for use in the analyses described in this paper. The diagrams below include slight modifications to the details of the above models of virtual organisation to expose additional detail, and to correct minor structural flaws. For example, the virtual face model below emphasises that the customer relates to the virtual face rather than the underlying organisation. The value chain model below has also been amended to show that customers usually interact only with one end of the value chain.

Virtual face

The virtual face virtual organisation is an alternative representation of a conventional organisation. In most cases of interest, this is an Internet-enabled organisation that works closely with the conventional organisation that underpins it, e.g. Internet banking organisations are commonly ‘virtual faces’ closely associated with traditional banks. In such an operative systems solution, the traditional core organization carries the whole burden of extending the above four processes of holistic business idea implementation to the virtual space. The two key questions are: ‘to what extent programmed internal and market learning can turn tacit knowledge into electronic automation of services and build them into the e-system’, and ‘to what extent can expert tacit knowledge be reduced to explicit knowledge simple enough to enable network members to use the virtual systems solution. Those who will not or cannot learn what is needed to use the e-solution will be served by the traditional system. In order to maintain a unitary brand, the virtual and the traditional organizations have to share all cultural traits connected to the personality of the brand.
Star Alliance

Star alliances occur when a group of otherwise independent organisations are clustered around a single key organisation (the star). This is common in many fields that have a tradition of main contractors and subcontractors.

In a Star Alliance, the core organization carries the whole burden of implementing the four processes of business idea implementation. The star builds the personality and image of the corporate brand, as well as the various branded products and services offered to the customers. The star will gain supplier power if its leadership is able to customer-orient its sub-contractors. That requires the star to have a broad constituent orientation that as a minimum contains strong up- and down-stream market-driven learning. It is not important to encourage the development of common cultures between the sub-contractors and the star. Such an effort may in fact be detrimental to the network’s ability to produce generative learning needed for proactive behavior and breakthrough innovation as seen by the customers. The star must put a lot of effort into using the data generated by the e-solution for interpretation and feedback to the sub-contractors to ensure customer orientation of the sub-contractors.
**Market Alliance**

Market alliances occur when a single organisation manages the relationships with customers. Market alliances are significantly different from star alliances regardless of their apparent structural similarity. The main difference is the ‘star’ of a star alliance is responsible for managing the whole of the virtual organisation, whereas the focus organisation in a market alliance only undertakes sales and marketing activities. A farm produce marketing association is an example of a market alliance: different farmers coordinate their production under the guidance of the marketing association, which also acts as an intermediary to customers.

In this situation, the ownership structure has a profound impact on the network’s ability to become downstream market oriented. If control rests with the producers, the tendency is to make strategic and operative decisions that make life easy for the alliance members, while customers receive inferior service, products, and variety to choose from. Strategies tend toward forced membership of upstream suppliers in order to achieve monopoly powers. The e-system tends to exploit economies of scale, rationalization, and competition on price rather than value-added, differentiation and segmentation. Product and service innovation tends to be stifled, while administrative and production process innovations tend to be overly supported. The e-system tends to become control-oriented. If several market alliances compete, the alliance that manages to remain most downstream market oriented will normally become the customers’ choice, but not necessarily the most profitable or competitive. The outcome depends on the heterogeneity and bargaining power of the customers relative to the same factors among the alliance members.

**Figure 4: Market Alliance**

![Market Alliance Diagram](image)

The dotted arrows signify that communication in the virtual operative network is only related to marketing and customer intelligence.

**Co-Alliance**

Co-alliances occur where organisations participate equally in managing the virtual organisation and interacting with customers. Examples of co-alliances are when businesses manufacturing different goods within the same market collaborate to gain economies of scale, scope and coordination. In this case the leaders of the cooperating organizations either have to establish a governance and leadership organization over and above the co-alliance members, with some form of inter-organizational operational teams, or have one of the organizations take the lead on defining and developing the common elements and systems. Such alliances are inherently unstable, and tend towards full integration or revert to market solutions (Lorange and Roos, 1992).
Organisations form themselves into a value alliance where there are benefits in integrating their value/supply chain. Value alliances are characterised by each member of the alliance adding value sequentially. The customer submits their order to the value chain, their order results in a flow of product through the value alliance. They are supplied from the organisation at the end of the value alliance chain. The value alliance & supply chain is jointly managed and individual order management is sequential passed from one member of the value alliance to another as the product passes along the value chain.

A common form of value alliance is the organisation of businesses into a virtual market, e.g. for the manufacture of raw materials into goods. The end-of-the-chain organization carries the main burden of creating a corporate image and brands, and must be highly up- and downstream market oriented in order to play its leading role. The end-of-the-chain organization must ensure that the upstream organizations become sufficiently customer-oriented, and take interest in developing the suppliers to become sufficiently integrated and competitive in the activities they undertake. Learning processes and e-solutions have to be integrated along the value chain through cooperative research and development. The e-system must allow for quick data throughput for value chain coordination. This type of network is inherently unstable, and will tend towards full merger or pure market-solutions at each stage of the value chain. The deciding factor is often whether the alliance manages to produce superior learning for adaptive and generative innovation in each critical activity. If superiority is achieved, merger normally follows. If one member organisation fails, it is often replaced.
The arrows signify the main flow of goods and services. In terms of communication the arrows would be interactive, but only along the value chain.

**Parallel Alliance**

Parallel alliances occur when two or more organisations must work together because their output is interdependent. This arrangement is common in computer software and hardware fields where, for example, an operating system is written specifically to utilise facilities provided by a particular central processing unit chip. In this case, the customer must be taught that the alliance partners are cooperating and ensuring that the solutions work together.

The network needs horizontal links between the cooperating organizations at all activity levels, including in the market place that is visible to the consumer. The two or more cooperating organizations do not, however, have to establish any leader or a common culture. Each party can also make arrangements with any number of competitors to their alliance partner. If, however, the cooperation between the alliance partners leads to learning and innovations that are consistently superior to other cooperative arrangements the two have, the alliance will tend towards full merger, and the exclusion, for both parties, of other horizontal alliances.

**Figure 7: Parallel Alliance**

![Parallel Alliance Diagram](image-url)
SUMMARY

This paper has brought together Tellefsen's theories and findings about Constituent Market Orientation and the taxonomy of virtual organisations developed at the School of MIS at Edith Cowan University. Combining these two theory streams enables the analysis of virtual organisations typical of e-commerce arrangements through the use of well-justified market orientation theories.

Undertaking these analyses points to the fact that:

E-commerce is most often an extension of business that also takes place in the real world.
The real and virtual solutions have to work together, i.e. promote a common image, provide synergies etc.

The extent of e-based solutions is dependent on the ability to convert tacit knowledge to automated e-systems and/or explicit knowledge at all user interfaces. Value creation that cannot be automated because of tacit knowledge has to be taken care of through real world exchange and production methods.

The virtual e-commerce has to be supported by other real-world processes of leadership, cultural harmonization, and learning for innovations in administration, technology, know-how, systems, products, services, etc.

The virtual solutions provide the real world actors with faster and new data that may both support organizational learning as well as operations. The virtual systems can only in a limited way interpret the data in the process of converting the data to knowledge, understanding, problem solving and innovation.
The need for one organization to take the on the leadership of the alliance depends on the nature of the alliance. The prime factor is the need to control and coordinate the interface with the customers, to provide a branding of the alliance in the minds of the consumers. This factor is independent of the degree of virtuality of the organization.

The alliances are inherently unstable, and will tend toward totally administered solutions through mergers, or towards pure market solutions. The relative efficiency of learning and innovation within the alliance versus freedom of choice and competitive learning and innovation efficiency will often decide the outcome. The future competitiveness of any e-commerce solution is dependent on these learning and innovation processes that can only be supported by the data stream from the virtual system.

The approach presented here has practical benefits in the ways that it enables the use of well-established and practically useful theories that support managing real world complex organisations in the development of theories about e-networking technologies and organisational structures:

It establishes an improved context for successfully creating e-spaces (virtual organisations) and using them in real situations.
It helps CEOs decide which virtual organisational structures are likely to be more successful in business terms.
It offers a foundation for using the properties of e-networks

The paper draws attention to two interface issues important to virtual organisations:
The interface whose purpose is the creation and governance of the virtual organisation.
The placement of the e-system with respect to the other production and transactional systems in organisational clusters.

The above practical and theoretical features imply that this approach to choosing virtual organisational structure supersedes prior methodologies whose predominant focus is on facilitating information management processes or providing technologically elegant solutions.
REFERENCES


Actual and perceived levels of risk in consumer e-commerce

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ABSTRACT

Most consumers perceive e-commerce as the riskiest shopping method in comparison with other methods of payment. Confidentiality of credit card numbers is an overriding issue restricting consumer participation in e-commerce. As a consequence, it is imperative to measure the levels of risk in e-commerce and other shopping methods. This study is an analysis of perceived and genuine risks associated with e-commerce. The levels of risks perceived by consumers in various shopping methods including Internet shopping are described, as are the levels of actual risk. The differences between the two are considered, and methods of dealing with the differences are given.

Keywords: Electronic Commerce (E-Commerce), security, encryption, cryptographic algorithms, actual risk, perceived risk, risk perception gap, Secure Sockets Layer (SSL), Secure Electronic Transaction (SET).

INTRODUCTION

E-commerce is an innovative business model that is driving organizations to transform their core business functions to remain profitable. In addition, it provides many useful functions, which facilitate a number of business activities, according to Ghosh (1998). Increasingly many companies are utilizing e-commerce technology as a medium of conducting business since it has advantages for both the supplier and the consumer. The emergence of e-commerce technology makes it easier for consumers to engage in online shopping because of the lower cost and ease of acquisition of products or services via the Internet.

Although e-commerce provides many benefits to consumers, e.g. convenience, greater choice, lower prices, and more information, there are also a number of barriers restricting its growth. The fact that breaches of Internet security are reported with great frequency means that there is a danger that potential users will be reluctant to engage in e-commerce because of fears about security. This means that user trust is a key enabler for the growth of the e-commerce market. Nonetheless, the real level of risks in e-commerce world and the level of risks perceived by consumers are still uncertain. Ideally, the risks involved in an e-commerce transaction should be no greater than the risks in a conventional transaction. The main objectives of this paper are as follows:

- to assess the main risks for home users engaging in Internet e-commerce;
- to assess home users' perceived levels of risk for various types of commerce, including e-commerce;
- to understand whether a disparity between the real and perceived risks exists.
For the purposes of this paper we assume that e-commerce payments are made using credit or debit cards. Whilst other forms of payment exist, debit/credit will probably remain the dominant payment method for some time to come.

POTENTIAL E-COMMERCE PARTICIPANTS

Recently, e-commerce has become a strategic tool for companies wishing to generate trade from the electronic consumer (e-consumer) on the Internet. The main requirement for a home user to engage in e-commerce is that the user has a connection to the Internet. We therefore suppose that all users with Internet access are potential e-commerce participants. Based on this assumption, Figure 1 shows that there are more than four hundred million potential e-commerce participants.

![Figure 1: Global Internet Population (millions)

Although there are various methods of accessing the Internet, we assume here that the home user connects to the Internet using a Windows-based PC equipped with a modem, and that web accesses are performed using a popular browser such as Internet Explorer or Netscape Communicator. Whilst a variety of access devices can be used, 56k modems are currently the most popular means of access (see Figure 2).

![Figure 2: Devices used to connect to the Internet
PERCEIVED RISKS IN E-COMMERCE

Human perceptions of e-commerce risks vary widely, just like other human characteristics. Some people believe that e-commerce is worth participating in because it offers several useful functions, such as convenience. On the other hand, others perceive e-commerce as being too risky. A survey of 2,810 adults was conducted by Harris Interactive Survey (http://www.harrisinteractive.com) in August 2000 to examine consumer perspectives regarding e-commerce. For example, they asked how many times that potential e-commerce participants had ordered online in the last twelve months, and where relevant the reason why they had never purchased via e-commerce. In addition, the survey also covers the types of information that need to be protected in e-commerce from the consumer perspective. The results are summarised in Figure 3.

3.1 How many times have consumers purchased online in the last twelve months?

![Pie chart showing distribution of online purchases in the last twelve months.](image)

3.2 Why has consumer not purchased online in the last twelve months?

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afraid my credit card number will be stolen online</td>
<td>57%</td>
</tr>
<tr>
<td>Afraid my personal data might be abused</td>
<td>57%</td>
</tr>
<tr>
<td>Worried that sellers may be fraudulent</td>
<td>38%</td>
</tr>
<tr>
<td>Want to talk to someone when placing an order</td>
<td>26%</td>
</tr>
<tr>
<td>Don't know if the seller is trustable</td>
<td>37%</td>
</tr>
<tr>
<td>Want to see a product in person</td>
<td>47%</td>
</tr>
<tr>
<td>Other</td>
<td>25%</td>
</tr>
</tbody>
</table>

Figure 3: Consumer attitudes to Internet shopping
Source: Harris Interactive, August 2000.
Participants: 2,810 Internet users, more than 18 years old
E-commerce and other methods of payment

As shown in Figure 3, there are many reasons restricting consumer participation in Internet shopping, such as sensitive information breach, merchant fraud, and social requirements. It can be seen that twenty-three percent of participants have never placed an order online in the last twelve months. Furthermore, forty-eight percent have ordered less than six times in one year. In such cases, trust in e-commerce is likely to be relatively low.

While the overall level of consumer confidence in e-commerce is still unclear, a survey conducted by the National Consumer Council Survey (http://www.ncc.org.uk) in April 2000, summarised in Figure 4, illustrates that most people believe that e-commerce is the riskiest shopping method in comparison with other traditional shopping methods, such as shopping over the telephone and using catalogues. Shopping centres are considered the safest shopping method.

In summary, the perceived risks associated with Internet shopping are greater than that for other shopping methods. Theft of credit card numbers is the overriding concern. Consequently, it is interesting to find out which process in online shopping consumers perceive as the most vulnerable. A survey conducted by Harris Interactive, summarised in Figure 5, also shows that the interception of sensitive information during transmission from consumer's computer to merchant's server is most commonly considered as the weakest link in e-commerce.
Figure 5: Consumer concerns regarding Internet security
Source: Harris Interactive, August 2000
Participants: 2,810 Internet users, more than 18 years old

From the information in the above figure, it would seem that most consumers are particularly concerned about the security of data transmission in e-commerce. This is consistent with Tomlinson (2000), who states that numerous consumers believe that security breaches occur during transmissions between clients and servers. This is despite the fact that e-commerce security encompasses a number of other aspects, including client-side security, merchant server security, application security and transaction security, (Ghosh 1998).

Sensitive information of concern to Internet users

In spite of the fact that e-commerce systems allow consumers to place an order directly through Internet systems, many potential users of e-commerce are hesitant to provide e-commerce merchants with their sensitive information. Friedman et al. (2000) state that lack of financial and security confidence are reducing consumer acceptance of this innovative online shopping technology. Figure 6 demonstrates what types of sensitive information are most in need of protection. Clearly, the confidentiality of credit card numbers, social security numbers, and personal financial information are of greatest importance to users.

Other issues

Whilst loss of personal data confidentiality during transmission is an overriding concern for consumers, there is another associated factor causing negative consumer perceptions of e-commerce. This is the inflammatory reporting of computer security incidents in the popular press. For example, instances of credit card fraud involving Internet use are often given very wide press coverage, out of proportion to their importance (Ghosh 1998).

Many information security experts argue that compromise of sensitive information in e-commerce is not likely during transmission, but through insufficient protection of merchants' web servers. According to (Caldwell 2000) in CommerceNet (http://www.commercenet.com/research), the theft of credit card numbers during transmission over the Internet is popularly perceived as the main concern to credit card fraud. In fact, credit card fraud often occurs at merchant web servers. This is the first example of where consumer perceptions of risk and the actual level of risk are rather different.
ACTUAL RISKS – CREDIT CARD FRAUD IN E-COMMERCE

We next consider the actual levels of risk associated with credit card transactions of both e-commerce and the more conventional types.

Transaction fraud risks

We start this analysis of actual risks by considering the levels of fraud in credit card transactions. From eMarketer (http://www.emarketer.com) of November 2000 we learn that Visa and MasterCard report rates of credit card fraudulent transactions of 0.08% and 0.09% respectively, for all types of transaction. As far as e-commerce credit card transactions are concerned, eMarketer from January 2001 reports that of 60,320,000 online B2C transactions in 1999, only 18,600 (i.e. 0.03%) were fraudulent.

It would thus appear that the risk of fraud per transaction is actually significantly lower for online transactions than for other types of transaction. Thus one might conclude that, at least with respect to the proportion of fraudulent transactions, e-commerce is actually one of the less risky forms of commerce. In the next section we examine specific types of conventional transaction in more detail, to discover which are actually the most risky.
Actual risks - technology assessment

It has been shown in the previous section that the incident rate of credit card fraud is low in comparison with conventional transactions. That is, the actual relative risks would appear to be directly opposite to consumer perceptions of relative risks. We now consider various types of transaction in a little more detail so as to understand better the real risks involved. We focus here, as throughout, on credit and debit card transactions.

In a high street transaction the retailer has access to a user's credit card for a short period of time, and therefore has the opportunity to copy all the information on the card. Moreover, the retailer will also have a copy of the transaction details, as needed for clearing and settlement, which again will contain most of the information on the card. Similarly, in a telephone transaction the retailer has access to a user's credit card number because this information must be passed to the retailer over the telephone in order to complete the transaction.

Credit card information transmitted over the Internet, however, seems to have more layers of protection in comparison with using credit cards to make payments in shops or when sending credit card numbers via telephone to place an order. According to Stein (1998), there are two main security protocols used to provide transaction security, namely Secure Sockets Layer (SSL), established by Netscape, and Secure Electronic Transaction (SET) created by Visa and MasterCard. Although both these protocols protect e-commerce transactions against potential eavesdroppers, SSL and SET work very differently. Also, while SSL is widely used, SET has not really been adopted.

During data transmission using the SSL protocol, cryptographic algorithms applicable to SSL, such as the Data Encryption Standard (DES), triple DES, and IDEA, are used to encrypt all data sent between the relevant parties (Hassler 2000). By this means, consumers are assured that their credit card numbers and other related sensitive information will be unreadable to an interceptor. SSL has different encryption key lengths varying from 48-bit to 128-bit, and its performance in securing data transmission is dependent of the lengths of the key. According to Burnett et al. (2001), 128-bit SSL encryption appears sufficiently secure to resist all attempts to break it, at least with current cryptanalytic techniques.

COMPARING ACTUAL WITH PERCEIVED RISKS

Perceived risks

E-commerce is perceived as the riskiest shopping method. Most consumers believe that the chance of credit card fraud in Internet shopping is high. Perceived risks in e-commerce can be summarised as follows:

e-commerce is very risky by comparison with other methods of payment;
loss of confidentiality of credit card information is the main issue.

Actual risks

By contrast, it has been shown that the credit card fraud rate in online transactions is actually low by comparison with the rate for conventional transactions. As a result, actual risks in e-commerce can be briefly summarised as follows:

Credit card fraud in e-commerce cannot happen as easily as consumers fear;
The level of actual risk in e-commerce is indeed lower than the levels of risk perceived by e-commerce consumers.
DEALING WITH THE RISK PERCEPTION GAP

As discussed above, the levels of perceived risk associated with e-commerce are very different from the levels of genuine risk. Most consumers are concerned that their credit card numbers can be compromised during transmission on the Internet. Furthermore, there is also other sensitive information, such as social security numbers and information about financial assets, for which sufficient protection is required to ensure consumer confidentiality, acknowledged as the key security goal for e-commerce merchants. As stated by Bhatnagar et al. (2000), an organisation wishing to succeed in this new business era needs to have a clear understanding of how to build up consumer confidence. In order to increase consumers confidence, it is important to consider how to deal with the difference in levels between actual risk and perceived risk (the 'risk perception gap') in e-commerce. This is the focus of the remainder of the paper.

Statement of consumer confidentiality

According to the Data Protection Act of 1998 as cited in Schneier (2000: 60), ‘organisations are prohibited from the collection, use, and dissemination of personal information without the consent of the person, and also have the duty to tell individuals about the reason for the information collection’. Similarly, consumers need to be assured that their sensitive information will remain private. A statement of consumer privacy must be placed in the e-commerce website in an obvious location. Consumers need to be assured that their information will not be exposed or used for any other purposes without their authorisation.

Techniques and tools for secure e-commerce

E-commerce merchants must employ appropriate methods to deal with the threats jeopardising e-commerce systems. It is the responsibility of e-commerce merchants to support the latest security techniques and tools to ensure consumer confidence. For example, e-commerce merchants should use SSL with 128-bit rather than shorter keys, to assure consumers that their private information will be secure against eavesdropping by even the most determined attackers. Merchants should consider making prominent statements about the techniques and tools they employ to ensure security.

Reporting problems with e-commerce

Broadcasters responsible for issuing material related to security weaknesses in e-commerce have a duty to be sufficiently well-informed to ensure that their reports are reliable and consistent with the real problems. For example, most credit card fraud cases in e-commerce occur because of weaknesses in merchant servers rather than interception of data transmission, which is securely protected by SSL or Secure Hypertext Transfer Protocol (S-HTTP) (Opplieger 2000). Broadcasters therefore need to understand the reasons for any security breaches in e-commerce, so that they can alert users to the real threats.

Solving the actual problem

It cannot be assumed that consumers, who are so concerned with security in data transmission, will be comfortable with the fact that breaches of sensitive information occur at the merchant server. Information stored in merchant servers must be appropriately protected to ensure that customer confidence is not damaged by actual attacks. As a result, dealing with the risk perception gap requires the real risks to be addressed, as well as those perceived as most serious by consumers.
Government support

There are numerous e-commerce merchants, and there are also many different tools and techniques employed by merchants to secure their online e-commerce infrastructure. These different techniques will have varying degrees of effectiveness in dealing with security threats, and consumers will have the problem that they have no idea how secure each merchant is. It would therefore increase consumer confidence if government regulation (and/or codes of practice) could be used to enforce minimum levels of security protection for e-commerce sites. One might envisage the development of a ‘special version’ of security baseline standards such as BS 7799-1 (=ISO/IEC 17799), applying particularly to e-commerce merchants. Merchants could then display prominent notices on their web sites, claiming adherence to the relevance baseline documents.

SUMMARY AND CONCLUSIONS

It is clear that the level of e-commerce participation is critically dependent upon consumer confidence in e-commerce security. Many consumers fear that their financial information will be compromised due to lack of security in online shopping. Levels of perceived risk, which may increase or decrease, are determined by the levels of confidence that consumers have in this innovative business. An e-commerce organisation should focus on strategies that can build up consumer confidence, so that security and convenience are sufficient to encourage consumers to participate in e-commerce. Consumer trust in the online world cannot be separated from the future of e-commerce.

In future related research we will consider how effective existing security schemes for e-commerce transactions (notably SSL and SET) are in addressing consumer concerns. This will lead to a better understanding of how best to approach e-commerce security issues from the perspective of promoting greater consumer involvement in e-commerce.
REFERENCES


ABSTRACT

This paper explores why organizations invest in eCommerce applications and highlights some of the expected returns. A Delphi study was used to determine the underlying benefits of eCommerce investments and several formal financial and non-financial approaches to justification are identified and discussed. A framework is outlined which can be used to select a justification approach based on the aims of the project and the type of values and benefits expected. Attaining competitive advantage and developing new business opportunities were identified as factors that could be best justified using strategic or analytical approaches rather than financial justification.

Keywords: electronic commerce, benefits, investment justification

INTRODUCTION

A recent article by Goett (2000) compares embarking on an eCommerce (EC) venture with the movie Raiders of the Lost Ark:

‘Indiana Jones faces an unexplored Inca temple. While he has a map of the temple's location, he has no plan of its interior. No one before him had escaped that temple alive. Indy has to dodge flying spears, falling guillotines, and rolling boulders in his quest for the prize. The remains of his unlucky predecessors give him a clue of their fate, and he uses all his skills as an experienced archaeologist to identify likely traps. He manages to escape with the treasure because he is bold, fearless, and knowledgeable. He is also very, very agile.'

Today, in uncertain economic times, managers face increased pressures to make sure that eCommerce investments have certain paybacks but in the race to be first to grab the prize they face pitfalls and traps that can mean certain financial death. In the dash to establish dominance in new markets, being first is sometimes seen as more important than doing it well. One CEO of a major corporation recently said that he approved a seven-figure budget request from the firm's Director of eCommerce in less than ten seconds because being first to market in the industry was a non-negotiable imperative. Yet ignoring formal justification of any investment has too often been a recipe for disaster.
Justification forms the basis on which decisions are made. It refers to any financial and non-financial approach, and should be interpreted in the broadest possible context, i.e. any method, process, procedure, technique etc. Remenyi et al (1997) illustrates this by suggesting that justification assists in understanding the impact of the change that an investment has on an organisation. As stated by Silk (1991) ‘Managers direct resources to achieve results’. However, the fundamental question is which investment will achieve these goals and how can the outlay be supported by a justification methodology. Organisations need to be able to set aside the hyperbole and consider how an investment will benefit their business processes, and thus determine whether the money spent is actually being wisely spent.

RESEARCH OBJECTIVES
The main objectives of this research were:

To investigate the benefits of investing in EC applications;
To highlight the justification approaches that best capture the issues regarding EC investments.

The first objective examines the various reasons as to why organisations invest in EC, to determine the benefits that they expect to attain and impediments they expect to avoid. These elements lay the foundation for what a justification approach must highlight, that is both tangible and intangible reasons.

The second objective was to develop a framework that captures the issues raised in the first part of the study. There are numerous justification techniques that are variations of other techniques, these can be altered to suit varying purposes, yet there is no suggestion of the reliability or suitability of these for justifying EC applications. This aim concentrates on analysing the various approaches and identifying where and how they can be used to justify EC investments.

APPROACHES TO JUSTIFICATION

Approaches to IT investment justification have been proposed by Earl (1989), Irani (1999) and Wen and Sylla (1999). Earl proposed the use of a four-way framework to formulate appraisal techniques for different purposes (see Table 1). The approach addresses organisational intentions and goals to be derived from using IT. The nature and characteristics of these goals are then determined in terms of tangibility, risk, judgement etc. Users are referred to suggested approaches/techniques that can be used to appraise investments.

<table>
<thead>
<tr>
<th>Aim</th>
<th>Goals</th>
<th>Nature</th>
<th>Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity and performance</td>
<td>Efficiency, Effectiveness</td>
<td>Tangible benefits, Clear argument</td>
<td>Financial, Net present value</td>
</tr>
<tr>
<td>New ways of managing</td>
<td>Change, Flexibility</td>
<td>Radical concept, Multi-dimensional</td>
<td>Multi factor, Metrics</td>
</tr>
<tr>
<td>Competitive advantage</td>
<td>Product-market positioning, Competitive disequilibrium</td>
<td>Concrete vision, Commercial judgement</td>
<td>Strategic analysis, Tests</td>
</tr>
<tr>
<td>Developing new business</td>
<td>Diversification, Growth</td>
<td>Business venture, Risk and uncertainty</td>
<td>Business case, Business plan</td>
</tr>
</tbody>
</table>

Table 1: Earl's four-way framework
(Adapted from Earl, 1989)
Wen and Sylla (1999) took a slightly different approach by recognizing opportunities and threats of failure, classifying evaluation methods in terms of tangibility and risk. They argue that benefits are lost through inappropriate management and lack of recognition during planning, thus should be identified and measured prior to selecting a justification approach. Risk should also be taken into consideration to recognise uncertainty of the future. The analysis somewhat reiterates Earl’s four-way framework in that it identifies benefits and links them to the various justification approaches identified.

Neither Earl nor Wen and Sylla identify any specific approaches to eCommerce justification so this was one aim of our study.

RESEARCH METHODOLOGY

The Delphi technique (Linstone et al., 1975) was used in this study because of its ability to aggregate individual ideas. Participants were invited to put forward their experience and knowledge anonymously in their own time and benefit from the results. Willingness and motivation to participate was high because organizations have experienced difficulty in justifying their EC applications and were eager to find answers. Delphi sets aside any predetermined thoughts influenced by the literature and seeks to identify results based on what is experienced in the real world. The underlying benefit of the Delphi technique is that both the respondents and the researcher can gain a valuable insight into an issue as it comes to conclusion. A diverse body of knowledge and ideas are independently brought together and analysed by experts whom in turn learn off each other.

The study took place over four months, and consisted of three rounds of questionnaires which can be summarised as follows:

Round 1: Identifying the justification approach(es) used to highlight the issues regarding investments in Web applications.

Round 2: Ranking the justification approach(es) used to highlight the issues regarding investments in Web applications.

Round 3: Seeking consensus on justification approach(es) used to highlight the issues regarding Web investments.

The series of questionnaires began with a fairly broad question concerning problems, objectives, solutions or forecasts. Succeeding questionnaires are then based on the responses of previous questionnaires, and the process continued until a consensus was reached.

The first questionnaire requested a brief description of the reasons why each organisation decided to invest an application on the Web. These factors may be internal and/or external to the organisation, such as to attract customers, improve competitive advantage, improve performance and productivity, for expansion and growth or to improve management. It also requested a brief description of what financial and non-financial techniques were used to show adequate grounds for proceeding with the investment. The intent of the broad scope of the initial questions was to allow participants to respond open-mindedly and respond without prejudice.

The second questionnaire was short enough for the respondents to review, criticize, support, or oppose (Delbecq, et al., 1975). It was more restricted and asked the participants to review the benefits and techniques identified in the first questionnaire and argue in favour of or against the benefits and approaches identified. The aim was to help participants understand each other's position, introduce different ideas and to move toward accurate judgements concerning the relative importance of the benefits and techniques.
The selection of participants was based on organizations that were involved in investing in EC applications, from well-developed and fully functional sites to yet to be developed sites.

FINDINGS

All participants were able to adequately answer the section regarding the benefits, identifying a total of 31 different benefits. Each participant actively took part in identifying and commenting on the benefits of investing in EC applications. The section on justification on the other hand was somewhat more complex, emphasizing the difficulty of justification. A total of eight different justification approaches were identified. Each approach had a varying number of corresponding issues supporting their appropriateness to EC applications.

MAIN REASONS FOR INVESTING IN WEB APPLICATIONS

These are discussed below in terms of achieving competitive advantage, expansion and growth effects, and improving productivity and performance.

Competitive Advantage

Providing access 24 hours a day, 7 days a week
The main reason influencing organisations to invest in EC applications was perceived to be the ability to provide access to information and service 24 hours a day, 7 days a week. This reason was ranked highly by 80% of participants. Comments suggested that constant accessibility and greater access provided by EC applications assists in achieving customer satisfaction.

Effective promotion of the organisation together with the products and services it produces
The Web was viewed as an 'adjunct to existing marketing', allowing consumers to learn about the organisation at a time that suits them with the 'potential to increase awareness and sales'. This was selected in the top ten by 78% of participants.

Enhance quality and speed of customer service
Deemed important by 67% of participants. The argument put forward was that 'if the customer isn’t satisfied with the experience, why do it'. It was also noted that unless it was developed properly it would be detrimental to the organisation.

Create competitive advantage and subsequently avoid competitive disadvantage
Selected by 67% of participants, the argument was that EC applications extend the opportunity to improve competitiveness. Niche markets in particular benefit from such opportunities. One participant raised the issue of there being 'no second places in the WWW world'.

Entice shoppers and encourage customer interaction
EC applications are considered to be an 'adjunct to existing marketing', allowing people to anonymously interact with the organisation and potentially increase sales. It also takes a new approach to attracting customers. Other forms of marketing generally search for the customer, whereas with the Web, it is the customer that does the searching.

Bandwagon effect
Although only one participant selected this as most important, it did attract an interesting discussion. One participant felt that although the 'everyone else is doing it argument' is true; it does not allow the organisation to control its future. Other participants felt it was more important for an organisation to 'evaluate whether the company is ready and able to participate', reiterating the importance of justification.
Expansion and Growth Effects

Supporting core business functions
It was suggested that ‘unless a web presence is part of a wider business strategy, it will be unlikely to survive’. Others felt that growth took time so investing in and refining EC applications led to benefits in future years.

Providing new business opportunities and exposure to new untapped market niches
The argument was clear that EC applications offer the ‘opportunity to create markets’ that are more accessible than the traditional economy. Such opportunities were then related to the issue of potentially increasing profits. This was selected in the top ten by 73% of participants.

Increasing market presence
Selected by 53% of participants, increasing market presence was deemed to create awareness of products and services.

CREATING A CORPORATE PRESENCE
This simple act of creating an Internet presence was said by 47% to ‘create awareness’ of the organisation itself.

To facilitate on-line purchasing and generate revenue from electronic sales
Perhaps one of the most interesting results was the relatively low ranking given to generating more sales. Only 40% of participants regarded this as one of the top 10 benefits. Although one participant described it as an ‘extra revenue stream’, it was not deemed to be as important as simply attracting customers to the organisation.

Accessible research tool
Selected by 40% of participants, EC applications were regarded as time and money savers in that they assist in doing things quickly, efficiently and at a lower cost. It led to more ‘educated customers’ since the accessibility and ease of use of EC applications, allowed them to study what was on offer.

Improving management and business processes
Improving internal and external communication and timely access to key stakeholders (i.e. suppliers, customers) and improved internal business processes were seen as key benefits of Web investments. One participant regarded improving business processes as a ‘critical change catalyst’.

Improving Productivity and Performance
Benefits supporting productivity and performance goals were considered to be the least important factors influencing organisations to invest in Web applications. Reducing operating costs was selected by only 40% of participants, suggesting that Web applications assist in lowering transaction costs in comparison to other alternatives but this is not the main reason for the investment.

Ease of use was considered important in that in order to ensure success people need to feel comfortable and accustomed to Web use. Improving productivity and morale among employees was initially suggested to be of benefit, yet based on later comments, appears minor in comparison to the other benefits suggested.
APPROACHES TO JUSTIFYING WEB APPLICATIONS

Approaches to EC justification identified in the survey provided interesting results, particularly when comparisons are made with the IT literature. The main approaches identified were:

Critical Success Factors (CSF)
CSF was seen to be an important justification method by 87% of participants. The approach highlights strategic issues such as ensuring that the organisation remains competitive and providing improved customer satisfaction by the use of better technologies. The approach can be tailored to identify vital time dependant factors crucial to success.

Cost Benefit Analysis (CBA)
CBA was selected in the top 10 by all but one participant. However, it was suggested that the value of reducing costs and achieving revenue growth changes over time so these aspects are difficult to quantify. At the outset several participants felt that CBA was the most effective justification model but as other models were raised by study participants views changed.

Return on Investment (ROI)
Analyses tangible benefits minus costs and is based on the assumption that investing today will reap returns over future periods. It was accepted that traditional ROI calculations "may yield simple answers yet create long term problems". ROI was selected by 60% of participants. However, questions were raised as to how cost savings could be accurately measured using this approach.

Payback Period (PB)
Examines the length of time it takes for an investment to recover the initial outlay. This approach was considered "simple and easy to calculate and understand", which is why it is readily used. On the other hand, participants felt that highlighting savings that cover set up costs is only a small part of justification and does not accurately reflect long-term investment potential.

Net Present Value (NPV)
NPV is used because it compares costs and savings in today's terms. However, few positive comments were made regarding this approach because it was perceived to be built on "faulty assumptions" such as estimating future profits, taxes, inflation and deciding on which discount rate to use.

Information Economics (IE)
IE (Parker et al., 1988) emphasizes the necessity of dealing with justification problems by defining the value of information to an organisation. It includes value linking, value restructuring, value acceleration, and innovation evaluation. IE was said to be useful in identifying then evaluating, scoring and ranking all potential positive and negative factors associated with a project and therefore the raising awareness of key stakeholders about issues concerning the evaluation process.

Balanced Scorecard (BS)
The BS approach (Kaplan et al., 1996) was considered relatively important for communicating vision and strategy (60%) and "supplementing traditional measures" by taking into consideration customers, business processes, learning and growth. It was also suggested that this approach can be used to identify actions an organisation can take to improve performance.

Value Analysis (VA)
VA assists in judging which intangibles are of greater value to the organisation. Participants using this approach suggest that it 'improves communication between analysts and users', when judging what was of value to the organisation. In addition, it was said that due to the ability to change what was meant by 'value', justification could be tailored to suit every organization and investment individually.
A CLASSIFICATION SCHEMA

In general, it was found that the justification methods typically fall into four groups. These are:

Strategic techniques which view the long-term impact of the organisation taking into consideration both tangible and intangible factors, which ultimately lead to competitive advantage.
Analytical approaches which are highly structured incorporating risk into the analysis, and relate to developing new businesses with growth and diversification.
Integrated approaches which combine subjectivity with formal structures to integrate financial and non-financial techniques, focusing on the organisation itself in terms of the way it operates.
Financial techniques which relate to structured valuations of tangibles, that in essence have been deemed appropriate to productivity and performance.

In Table 1 we have classified the types of benefits that organizations have derived from EC applications and compare these against possible justification methods. The framework may not be applicable to all organisations, yet it does give an indication as to what is possible.
<table>
<thead>
<tr>
<th>BENEFITS DERIVED</th>
<th>Issues Highlighted</th>
<th>APPROPRIATE: CRITICAL SUCCESS FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aim: Competitive Advantage</td>
<td></td>
<td>Competitiveness</td>
</tr>
<tr>
<td>Provide 24 hours/day 7 days/week access</td>
<td></td>
<td>Timely service</td>
</tr>
<tr>
<td>Effective promotion of organisation, products and services</td>
<td></td>
<td>Greater exposure</td>
</tr>
<tr>
<td>Enhance quality and speed of customer service</td>
<td></td>
<td>Access to new markets</td>
</tr>
<tr>
<td>Create sustainable competitive advantage</td>
<td></td>
<td>Need to have a Web presence</td>
</tr>
<tr>
<td>Entice shoppers and encourage customer interaction</td>
<td></td>
<td>Creating widest possible user base</td>
</tr>
<tr>
<td>Bandwagon effect</td>
<td></td>
<td>Promotion</td>
</tr>
<tr>
<td>To keep up with trends in technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aim: Expansion &amp; Growth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support core business functions / Integral to business strategy, long term vision and goals</td>
<td></td>
<td>APPROPRIATE: VALUE ANALYSIS</td>
</tr>
<tr>
<td>Provide new business opportunities and exposure to new untapped market niches</td>
<td></td>
<td>Assists in judging which intangibles are of greater value to the organisation</td>
</tr>
<tr>
<td>Increase market presence</td>
<td></td>
<td>Emphasises value rather than cost</td>
</tr>
<tr>
<td>Creating corporate / Internet presence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-line purchasing / generate revenue from eCommerce sales</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accessible research tool</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Levelling the playing field – globalisation, expand market place</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Web is seen as the way of the future</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interlinking – providing relevant links to other sites</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aim: Improve management &amp; Business Processors</td>
<td></td>
<td>COMMUNICATIONS: BALANCED SCORECARD</td>
</tr>
<tr>
<td>Improve internal and external communication with key stakeholders</td>
<td></td>
<td>Communicates organisational vision and strategy</td>
</tr>
<tr>
<td>Improve internal business processes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improve internal communication by providing organizational information to all staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timely marketing information and sales</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timely information retrieval and utilization (accuracy &amp; reliability)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilitate remote interaction with video capture interface</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aim: Productivity &amp; Performance</td>
<td></td>
<td>APPROPRIATE: COST BENEFIT ANALYSIS</td>
</tr>
<tr>
<td>Reduce operating costs</td>
<td></td>
<td>Illustrates how information and service can reduce delivery time and cost</td>
</tr>
<tr>
<td></td>
<td></td>
<td>APPROPRIATE: RETURN ON INVESTMENT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Identifies how the use of technology achieves significant cost savings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>APPROPRIATE: PAYBACK PERIOD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Illustrates how savings in support costs cover set up costs</td>
</tr>
</tbody>
</table>

Table 1: A Framework for Justifying EC applications (Adapted from Earl, 1989 and Irani, 1999)
CONCLUSIONS

As suggested in the management literature, the main reasons for investing in EC applications can be attributed to gaining intangible benefits. The findings of this survey heavily support these claims given that the main tangible benefit identified related to reducing operational costs such as marketing expenses or transaction fees.

Surprisingly, the majority of reasons for investing in EC applications produced non-quantifiable returns and yet the majority of most appropriate approaches to justification were financial, requiring quantifiable data. It appears that there is a degree of confusion as to whether the financial approaches can be appropriately used to justify EC applications. It was evident in both the literature and the findings that many benefits can be derived from investing in EC applications. The benefits that were identified in the findings emphasised the nature and importance of these benefits. Such benefits were then attributed to Earl's four-way framework that broadly attempts to link organisational aims to justification approaches. The benefits that were considered to be of most importance were those concerned with competitive advantage and expansion and growth of the organisation, in particular, providing information access 24 hours a day 7 days a week and supporting core business functions. Productivity and performance benefits on the other hand appeared to be of least importance.

In terms of the justification approaches, very few approaches were identified in comparison to the extensive range identified in the literature. In particular the traditional cost benefit analysis was by far the most popular as it highlighted how information and service can reduce delivery time and cost. It appears that the most appropriate form of justification is to determine factors deemed essential to the survival of the organisation, which reiterates the importance of strategic thinking. The well known cliché suggesting that one cannot manage what cannot be measured, still demonstrates the importance of understanding where and how money is being used, and what benefits an investment is expected to generate.
REFERENCES


ABSTRACT

The adoption of electronic commerce strategies is becoming an important means of assisting industries, and indeed whole economies, to gain significant net benefits. The extent to which eCommerce-based strategies, such as quick response and efficient consumer response, might have an effect on local economies depends in part on how readily they are being adopted. The dominant form of adoption of these strategies is to be found in the business-to-business forms of eCommerce. To be successful, all business partners must be in a position to share data. This paper presents the initial results of a national survey completed in the retail sector of the Australian economy, that assesses how well Australian industry is responding to the eCommerce challenge.

Keywords: quick response, efficient consumer response, EDI, customer intimacy, collaborative planning & forecasting, replenishment

INTRODUCTION

Two independent reports prepared for the Australian Government (National Office for the Information Economy, 1999) and the European Commission (EC) (FAIR Project Consortium, 1998) outline many of the potential net benefits that the Australian economy and countries within the European Union (EU) could gain from the adoption of eCommerce strategies. These reports are significant, because they attempt to assess the impacts of the adoption of eCommerce on various sectors of each economy. In particular, they examine the likely macroeconomic effects from the continued rapid expansion of eCommerce by examining contributions to growth in output and consumption, in employment and productivity, to the economies of two quite different regions.

Both reports agree that there are generally potential positive multiplier effects and new job creation consequences. The EU predicts that even taking into account direct substitution effects and traditional job reductions, the indirect multiplier effects on production, value added and employment growth is 'three indirect jobs for each direct job created' (p2). It further estimates that revenues of 58 billion ECU are possible by 2001. Much of the revenues will be generated from 'introducing a new, richer dimension of interaction within supply chains and in seller-buyer relationships. New intermediation, rather than dis-intermediation, represents the largest source of new business opportunity' (p2).
The Australian Government report, which focuses on the structural changes that eCommerce may bring, suggests that the widespread adoption of eCommerce predicts that the more efficient way of doing business (online) will result both directly and indirectly in net benefits. The simulation studies conducted as part of the project, suggest that ‘the net impact could be a 2.7 per cent increase in the level of national output, and enhance consumption (a better indicator of material wellbeing) by about $10 billion within the next decade’ (p2).

Both reports agree that the contributions to growth will initially be made in the business-to-business domain of eCommerce adoption. Initially, this will be the domain that will gain the most from improved efficiencies through reduced costs and prices and improved business practices.

This paper presents the results of a national survey conducted in Australia of organisations that have undertaken eCommerce activities primarily in the business-to-business domain of the Australian retail sector using QR and ECR strategies. The results presented in this paper provide additional insights into earlier work by Harris and Swatman (1999) Harris et al. (1999) and McMichael, et al. (1997, 2000) who concentrated on the effects of adoption of efficient consumer response (ECR) strategies in the Australian grocery industry and quick response (QR) in the Textile Clothing and Footwear industries respectively.

This survey was completed during 1999, covering companies who are mostly suppliers to much larger retail customers. Where available, results are compared with those from an international report prepared by Kurt Salmon Associates (Kurt Salmon Associates, 1998). This comparison allows the Australian retail sector to gauge how successful it is in comparison with the available US results.

ECOMMERCE AND THE AUSTRALIAN RETAIL SECTOR

Quick response (QR) is a business strategy enabled by IT to improve communication and coordination between supply chain partners. By its strategic nature, QR creates a business opportunity that seeks to achieve an alteration to existing business practice (Hadjiconstantinou, 1998). QR has also been called the retail industry’s version of just in time (JIT) manufacturing because it seeks to better manage and move inventory through the supply chain. A related strategy is efficient consumer response (ECR) which was originally based on QR, but specifically applies QR principles to the grocery industry (Harris et al., 1999).

QR, ECR and JIT aim to keep inventories as low as possible, without goods running out, and to quickly resupply goods as they are needed to prevent stocking out. QR and ECR extend beyond the paired relationships that are often found in JIT manufacturing by creating partnerships that extend to all levels of the supply chain. While existing views of QR have been adequate for focusing on particular aspects of QR arrangements they often overlook some of the essential elements required when QR is seen as a total business strategy.

One of the key drivers of this business strategy is the degree of competition being experienced by global firms. Strader et al. (1999) stress that it is this intense competition in most industries that is making organisations look toward better ways to improve product quality, customer service and operating efficiency, just to remain competitive. QR and ECR are two of the business outcomes firms have used to meet the competitive challenge.
RELATED PRIOR RESEARCH

There are many definitions of QR and ECR. The preferred definition for this study is:

QR (and ECR) is a consumer driven business strategy of cooperative planning by supply chain partners, to ensure the right goods, are in the right place, at the right time, using IT and flexible manufacturing to eliminate inefficiencies from the entire supply chain.

This research focuses on the cooperative, computer based communication aspects of QR and ECR which, as Zwass (1998) describes, form part of a hierarchical structure of eCommerce levels, which includes partnerships (business relationships), IT and information sharing. In Zwass’s terms, we reflect his meta-level of products and structures (Level 7) which relates directly to interorganisational supply-chain management.

A US study in 1986 examined the flow of products in the supply pipeline from raw materials into textiles, to apparel, to retail and finally to the consumer. The results of the study (see Blackburn, 1991), showed that it took on average 66 weeks to move from a raw material to a finished good distributed to the consumer, as outlined in Figure 1. A $25 billion efficiency loss was estimated to be occurring due mainly to forced markdowns, discounting, stock outs and increased carrying costs for excess inventory. Forecasting problems affected the industry because the span of the forecasts in the product pipeline extended beyond a year. All parties could only estimate what goods the consumer would demand by the time the product reached the market.

![Figure 1: The Apparel Pipeline](source: Blackburn (1991))

Blackburn (1991) reports that the initial study suggested that forecasting could be improved in two ways. First, by increasing the accuracy of planning systems and second, by reducing the time between making the forecast and the actual event occurring. It was thought that while the accuracy of planning could be improved, the greatest gains could be attained from taking time out of the supply pipeline—to move the stock forecasting decisions closer to the customer in time. By eliminating the slack time, the length of the supply pipeline could be reduced, which would decrease the level of uncertainty in the decision making process, because forecast error decreases in proportion to the time until the event. As a result pipeline acceleration was born.

The introduction of universal product codes (UPC) and point of sale (POS) scanning in the mid-1980s made it possible for retailers to track product movements themselves at both the distribution centre (DC) from incoming and outgoing receipts and at the store level from POS scanning. At the same time EDI networks were being established between retailers and their suppliers and some manufacturers were establishing EDI with their suppliers. Clemons and Row (1993) found that the adoption of EDI by retailers and their suppliers had led to short term benefits, due mainly to administrative savings, where EDI was used to automate existing document exchanges. Clemons and Row concluded that the potential existed to achieve greater savings using EDI to restructure the logistics system to reduce costs.
The availability of detailed information collected at the POS coupled with EDI made it possible to disseminate sales data throughout the supply chain as shown in Figure 2, where sales data flows back down the supply chain from the point of sale.

Using QR, the flow of products and the flow of information in the apparel pipeline are both increased in velocity. Goods are moved forward to the customer faster by reducing manufacturing and shipment times, and by eliminating inefficiencies that are not beneficial to the supply chain as a whole. Allowing this faster flow of goods to occur is the increased responsiveness available through faster communication of consumer preferences back to all members of the supply chain using computer-based communication systems.

This research paper presents some initial results of a national survey of the extent of eCommerce (particularly the adoption of QR and ECR strategies) in supply firms within the Australian retail supply chain. The paper concentrates on the issue of process improvement, and includes the issues of:

- Consumer intimacy
- Collaborative planning and forecasting

![Figure 2: Two Way Product and Information Flows in the Supply Chain](Source: Blackburn (1991) Stock replenishment eCommerce support)

**AUSTRALIAN RETAIL SURVEY**

This national survey was conducted between March and June 1999. To make the survey internationally comparative, the Kurt Salmon Associates (1998) survey was used. The survey instrument itself was modified to reflect the Australian retail industry’s use of local terms. Two separate questionnaires were sent to the quick response/eCommerce coordinator of each supply company (50 questions) and each retailing organisation (39 questions). This paper reports only on the supplier survey.

The targeted population was confined to suppliers to the Australian retail sector that were trading electronically with at least one customer. All suppliers included in the survey were trading electronically with their customer base that included the largest retailers in Australia (including Coles Myer group, Woolworths and Big W). Approximately 1,500 companies were identified from a list of suppliers provided with the assistance of the Australian Retailers Association. The effective response rate was 11 per cent.
A profile of these companies is illustrated in Table 1

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency (No)</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clothing and footwear</td>
<td>3</td>
<td>1.8</td>
</tr>
<tr>
<td>Appliances/consumer electronics</td>
<td>9</td>
<td>5.6</td>
</tr>
<tr>
<td>Books/audio/video</td>
<td>9</td>
<td>5.5</td>
</tr>
<tr>
<td>Packaged/consumer goods</td>
<td>48</td>
<td>29.4</td>
</tr>
<tr>
<td>Hardware/home improvement</td>
<td>13</td>
<td>8.0</td>
</tr>
<tr>
<td>Sporting goods</td>
<td>8</td>
<td>4.9</td>
</tr>
<tr>
<td>Textiles and fabric</td>
<td>10</td>
<td>6.2</td>
</tr>
<tr>
<td>Health and beauty aids</td>
<td>16</td>
<td>9.8</td>
</tr>
<tr>
<td>Furniture/home furnishings</td>
<td>9</td>
<td>5.5</td>
</tr>
<tr>
<td>Non-perishable food and beverages</td>
<td>15</td>
<td>9.2</td>
</tr>
<tr>
<td>Perishable food and beverages</td>
<td>10</td>
<td>6.2</td>
</tr>
<tr>
<td>Other</td>
<td>13</td>
<td>7.9</td>
</tr>
<tr>
<td>TOTAL</td>
<td>163</td>
<td>100</td>
</tr>
</tbody>
</table>

A profile of company turnover is illustrated in Table 2

<table>
<thead>
<tr>
<th>Turnover ($ million)</th>
<th>Frequency (No)</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; $5 million</td>
<td>57</td>
<td>34.9</td>
</tr>
<tr>
<td>$6–10 million</td>
<td>25</td>
<td>15.3</td>
</tr>
<tr>
<td>$11–25 million</td>
<td>33</td>
<td>20.2</td>
</tr>
<tr>
<td>$26–50 million</td>
<td>15</td>
<td>9.2</td>
</tr>
<tr>
<td>$51–100 million</td>
<td>12</td>
<td>7.4</td>
</tr>
<tr>
<td>$101–200 million</td>
<td>6</td>
<td>3.7</td>
</tr>
<tr>
<td>$201–500 million</td>
<td>7</td>
<td>4.3</td>
</tr>
<tr>
<td>$501 million – $1 billion</td>
<td>3</td>
<td>1.8</td>
</tr>
<tr>
<td>Not reported</td>
<td>5</td>
<td>3.2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>163</td>
<td>100</td>
</tr>
</tbody>
</table>

**RESULTS**

**Customer Intimacy**

The term *Customer Intimacy* is now used to suggest that suppliers need to develop intimate partnerships with customers to differentiate themselves from competing suppliers. The aim is to turn a satisfied customer into a loyal customer. Customer intimacy highlights the ability to understand and respond to highly specific and changing needs of very specific customers by continually tailoring products and services to precisely meet those needs.

Information systems give clues to customer preferences but Wiersema says that a human touch is required in learning what people really want (Wiersema quoted in Klinkerman, 1999). He points to three major customer priorities. The first is transparency where you must make customers feel that you are being accurate, reliable and responsive to their needs. The second is distinctiveness where you must give them a clear and compelling reason to choose you over other alternatives. And the third is leadership, where customers love to associate themselves with winners and companies that are going places. The degree of customer intimacy was measured by the extent of shared data between the customer and the supplier. In particular, the extent to which POS data from customers is shared with suppliers.

Fifty two per cent of suppliers who were trading electronically were given access to POS data from their major customers. This represented on average 32 per cent of their total sales. Kurt Salmon reported that in the US in 1998, the comparable figure was 79 per cent with access to POS data. Interestingly, about one third of suppliers...
were using a data warehouse to store the data received from customers. Table 3 illustrates the type of data maintained by suppliers with a data warehouse.

Table 3: Type of data stored in data warehouse

<table>
<thead>
<tr>
<th>Data type</th>
<th>Australian Survey 1999 per cent</th>
<th>Kurt Salmon 1998 per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own products</td>
<td>32.5</td>
<td>-</td>
</tr>
<tr>
<td>Category data</td>
<td>13.5</td>
<td>33</td>
</tr>
<tr>
<td>Promotion/in-store display history</td>
<td>11.0</td>
<td>14</td>
</tr>
<tr>
<td>Store demographics</td>
<td>6.1</td>
<td>14</td>
</tr>
<tr>
<td>Market basket data</td>
<td>4.3</td>
<td>8</td>
</tr>
</tbody>
</table>

Collaborative Planning and Forecasting

Collaborative planning and forecasting is a set of business practices based on shared information and planning among partners. It consists of an established set of business practices that trading partners agree to follow. Its success depends on the partners sharing information and forecasts, usually via the Internet and electronic data interchange (EDI), to more accurately replenish shelves. Everyone involved in collaborative planning and forecasting agrees that its impact will be dramatic. Still, the concept will require not only trust in partners, but also an investment in the technology that will allow disparate systems to communicate fluently.

The ability to form new relationships between supply chain partners to eliminate inefficient practices and accelerate the flow of goods through the supply chain is the goal of QR and ECR efforts. Increasing the level of customer intimacy and joint planning are one of the keys to achieving that goal. Suppliers were asked the extent to which they developed seasonal forecasts with their key retail customers. Approximately 43.4 per cent indicated they do not participate in preparing seasonal forecasts at all. Of the remaining 57.6 per cent who are involved in seasonal forecasts, the modal class represents between 10-30 per cent of customers.

It is very significant to note that 2 out of 5 suppliers were not actively preparing seasonal forecasts with their customers. This further underlines the troubling finding of Harris et al. (1999) that although there is quite a lot of interest in the QR and ECR supply chain initiatives there is a general lack of interest from suppliers in implementing the complete strategy. Respondents were asked whether their larger customers provided forecasts. Only 14.5 per cent reported any forecasts, although a few stated that they had plans to receive data within three years. They were also asked if they set joint goals with formal metrics with their key retail customers. Table 4 presents the results of the formal metrics used by suppliers.
Table 4: Metrics used by suppliers

<table>
<thead>
<tr>
<th>Formal metrics</th>
<th>Per cent using</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales goals</td>
<td>71.8</td>
</tr>
<tr>
<td>In-stock goals</td>
<td>44.8</td>
</tr>
<tr>
<td>Goals related to mass customised product</td>
<td>3.7</td>
</tr>
<tr>
<td>Profitability goals</td>
<td>25.8</td>
</tr>
<tr>
<td>New product success goals</td>
<td>18.4</td>
</tr>
<tr>
<td>Goals related to electronic sales of merchandise</td>
<td>6.1</td>
</tr>
<tr>
<td>Inventory turns goals</td>
<td>20.9</td>
</tr>
<tr>
<td>Total lead time goals (from product concept to on the selling floor)</td>
<td>20.9</td>
</tr>
<tr>
<td>Consumer satisfaction goals (from product concept to on the selling floor)</td>
<td>20.2</td>
</tr>
<tr>
<td>Fulfillment objectives</td>
<td>18.4</td>
</tr>
</tbody>
</table>

Stock Replenishment

Efficient retail replenishment is the single largest opportunity existing in the supply chain today (Williams, 1999). Many organisations are suffering from the dual problems of being out of stock at the shelf in some products and simultaneously having excessive inventories in retail stores in other products.

Consumers initiate the QR process of replenishment when they make purchases from the retail store—these purchases are expressions of their needs and wants. These needs and wants are recorded by the retailer as merchandise information usually by size, style, colour and brand from point of sale scanning.

There are three main ways in which a replenishment order can be generated from the POS data. The retailer may give the supplier a blanket type authorisation to prepare and ship orders as per agreed methods, without any review of individual orders by buyers. This is the vendor managed inventory (VMI) approach most commonly used by discount retailers and their suppliers. The extent to which this information is requested and used depends on the size of the supplier. Generally, large suppliers request this type of information and prefer to perform their own analysis in a vendor managed inventory (VMI) system, while smaller suppliers only want aggregated sales information.

The second approach involves the supplier preparing an order and then sending it to the retailer electronically as a reverse purchase order. Under this system the retail buyer reviews and approves the recommended quantities and makes any modifications if deemed necessary. While this approach takes more time than the VMI approach, it allows the retailer to make changes based on information that the supplier may not be privy to, such as rival's products being on promotion.

The final approach involves the retailer preparing replenishment orders using in house software and data analysis systems and then transmitting these orders, via EDI, to the suppliers. Some retailers that prepare their own orders still share their POS data with their suppliers to give the suppliers a better basis for sales forecasting and production scheduling. Customers are keen to maintain the absolute minimum level of inventory possible, subject to being able to maintain sufficient product to meet the demands of consumers. Too large an inventory will result in excessive holding costs, while frequent out-of-stock occurrences will result in missed sales.
The main benefits of the VMI approach are that inventory levels (especially safety stocks) can be significantly reduced and the risk of stock-outs is consequently reduced. This benefits both the retailer (lower holding costs and elimination of purchase order transactions) and suppliers (advanced warning of stock demand makes production requirements far more predictable) (Christopher, 1998).

McMichael, et al. (2000) found that improved planning had resulted from QR through increased information sharing from the elimination of ‘slack time’ which had occurred due to retailers withholding information. However this acceleration had only occurred in the first link of the supply chain between retailers and manufacturers and did not extend beyond this first tier. The demands by retailers to make smaller more frequent deliveries, the increased distribution costs incurred and the infancy of automated replenishment programs were cited as reasons why the accelerated movement of goods hadn’t flowed back through the supply chain.

Responding suppliers reported that 59.7 per cent were participating in automatic stock replenishment programs with their customers, 27.2 per cent indicated they had no intention of participating in such a scheme. The remaining 13.1 per cent had plans to introduce automatic replenishment within three years.

The finding that just over one quarter of the suppliers surveyed had no intention of participating in automated stock replenishment was surprising given that McMichael, et al. (2000) had found that firms participating in QR had strengthened their competitive position compared to those firms which were not participating in QR. The small size of the respondent firms, 50 per cent with a turnover of less than $10 million, and the retailers decision to concentrate on automated replenishment with large volume suppliers help to explain this finding. However, this finding clearly illustrates that eCommerce activities have not fully penetrated the retail supply chain and perhaps are unlikely to in the near future. This does call into question just how quickly some of the predicted benefits suggested in the EU and Australian Government reports will be realized and if these benefits will be partially offset by the incomplete adoption of eCommerce by smaller firms.

ECOMMERCE SUPPORT

The extent of electronic (online) support provided by organisations, particularly suppliers to their customers, often depends upon the level of maturity that organisation has with electronic commerce. Turban et al. (2000) suggests that the very lowest level of online support would be a basic Web site that provides current and potential customers with information about the nature of the products they sell (manufacture, wholesale or distribute). This phase is the information gathering phase, and often involves the setting up of an electronic catalogue of the supplier’s products. Links may be provided to other virtual sites associated with the company, which may include technical advice about the product. This level of service is similar to business to consumer type eCommerce where the individual shopper seeks basic information about a range of products they may wish to purchase. The difference between the two types of customers, is that in the business to business case, the customer is usually another business; in the case of business to consumer, the customer is usually an individual person. This stage is often termed electronic marketing.

At the other extreme, customers may be able to make their purchases online by filling out order templates which connect to back-end databases. More often than not, organisations are making use of EDI either formally using private value added networks, or increasingly, the Internet. Much larger organisations (both large suppliers and large customers) will offer access to their information systems via Extranets—a dedicated network between associated organisations via a private network arrangement or public Internet.

In between these extremes, eCommerce support implies the ability for business partners to check on product delivery status, to act as electronic intermediaries, or to simply provide a mechanism for facilitating contact e.g. using eMail.

Apart from customers sharing information with suppliers using POS and other data (e.g. direct forecasts from customers), suppliers are progressively using Web sites to provide customers with access to display catalogues, prices etc. The extent to which suppliers provide this facility is an indication of their support level for their customers.

Suppliers were asked if they had a Web site—39.4 per cent indicated they did (c.f. Kurt Salmon survey in the USA was 65 per cent). Of those companies that didn’t have a Web site, 39 per cent indicated their intention to have one within three years—21 per cent had no plans at all. Of those with a Web site on the Internet, Table 4 indicates what their Web site is used for.
The finding that 60 per cent of respondent firms did not have a Web site and that 21 per cent of those firms had no intention of creating one clearly illustrates the difference in eCommerce technology use between the USA and Australia at present and probably in the longer term. This means that caution is needed when comparing the two markets because there are likely to be key technological as well as size and market differences between the two. In addition this reinforces the finding of Harris et al. (1999) that there is a lack of commitment to adopting the underlying technologies and essential business activities necessary for QR and ECR in Australia.
CONCLUSIONS

Today the massive investment in IT is leading organisations to make changes in the way they think about and run their businesses. Williams (1999) succinctly summarizes the situation when he says we face 'change in what we do, how we do it, with whom we do it, and the tools we use to get it done'. There is no doubt that industry is facing new rules of business together with one of the toughest environments in which it has ever operated. When this environment is coupled with a consumer demand for more variety and immediate replenishment, supply chains have to cope with huge numbers of stock-keeping units.

With the early recognition of the importance of supply-chain management, industry leaders have used several different models to create uniform supply-chain management techniques. For instance, in the clothing, textile and footwear industry, QR has been used as a consumer driven business strategy of cooperative planning by supply chain partners (McMichael et al. 1997). And, in the grocery industry, efficient consumer response (ECR) has been concerned with transforming the grocery supply chain from a "push system" to a "pull system" (Harris et al., 1999).

The results presented in this paper, suggest that there is clear evidence to indicate the growing need for Australian suppliers to become more intimate, with increased cooperation in planning and data sharing with their customers (the large retailers). Compared with their American counterparts, Australian suppliers are not receiving the quantity and type of data they require to assist with forecasting and planning, and so assisting them to become more internationally competitive. While formal metrics were being used, they principally concentrate on techniques to measure traditional sales goals. Very few organisations were actually using other techniques to measure performance, e.g. lead time goals, inventory turns, or goals related directly to electronic sales of merchandise.

While the majority of supplier firms were involved in automatic stock replenishment schemes, it is of more concern that over a quarter of suppliers indicated that they had no intention of participating in such a scheme. This is not particularly good news for their large customers.

The level of eCommerce support provided by suppliers is considerably less (less than half) than their American counterparts. This suggests that Australian suppliers have a long way to go in providing electronic support to their key business to business customers.

In this new business environment driven by consumer demand, entire supply chains are under more pressure to be reliable, responsive and to fulfill orders even more quickly. For all organisations, the question today is how to build the business systems to deliver value tomorrow. If they are to deliver the sorts of economic benefits suggested by the FAIR Project Consortium and NOIE, then considerable efforts will be required by both the partners on either side of the virtual fence.
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Supply Chain Management and B2B E-commerce for a Non-profit Organisation

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ABSTRACT

This paper discusses the supply chain management and the impact of implementing E-commerce applications on enterprises. It examines the role of Porters work on supply chain and competitive forces. It discusses the role of value chain integration management in increasing customers' perceived value. It also explores the likely impacts of Internet technologies faced by the enterprise. In this paper, the traditional supply chain model and integrated value chain model are used to investigate the information flows of business processes of an international non-profit organisation #A.

Initially the paper describes how the company’s integrated value chain analysis was used to identify organisation #A current business processes. It then further focused on competitiveness and the role of Internet technologies in investigating information flows of business processes conducted in the new digital economy.

Keywords: Supply Chain Management, Porters Value Chain Analysis, Electronic commerce, Web-based legacy EDI.

INTRODUCTION

The main aim of this paper is to examine the role of Porters work on supply chain and competitive forces. It discusses the role of value chain integration in increasing customers’ perceived value to the enterprise concerned. It also examines the impacts of Internet technologies in effecting competitive advantage to organisation. In this paper, the Porters traditional supply chain model and the integrated value chain model are used to investigate the information flows of business processes.

In order to succeed in the digital economy, an enterprise must understand what its core competences are and how it can maintain its competitive advantage. This can be achieved by forming alliances with partners in order to provide customers with services that knit together seamlessly. As a result, value chain integration is seen as a tool for enterprises to achieve core competences. In a report by Cambridge Technology Partners, ‘a value chain integration is the process in which multiple enterprises within a shared market cooperatively plan, implement, and manage (electronically and physically) the flow of goods, services, and information from point of origin to point of consumption’ (Cambridge Technology Partners Report, 1998).
The first section of this paper introduces the literature currently available, on the role of integrated value chains that address the technology challenges faced in the digital economy. Following this, the second section provides the discussion of case scenario. The third section discusses the research methods used to examine the value chain integration analyses adapted from Porter (1985). The fourth section discusses the preliminary findings as to the role of factors that drive the supply chains and the impact of Internet technologies in effecting competitive advantage to organisation.

RESEARCH OBJECTIVE

This paper investigates business strategies for an international non-profit organisation #A. The paper is based on an exploratory study to apply Porters model to see how the company’s integrated value chain analysis was used to identify current business processes. The paper also investigates the role of Internet applications in determining the factors that affect the business-to-business e-commerce. It identifies shifts in the competitive environment that organisation # A needs to address. Specifically, these factors were identified as:

- the implementation and utilisation of Internet technologies in effecting competitive advantages to organisation #A;
- and the impact of legacy web-based EDI on organisation # A’s business-to-business e-commerce supply chain.

The paper concludes with recommendations for the future strategy of organisation # A business processes. It is anticipated the study will provide information and suggestions for organisation intending implementing traditional supply chain management and value chain integration model in creating competitive advantage for all stakeholders involved.

LITERATURE REVIEW

Porters Value chain Analysis Model

Micheal E Porter (1986) states that value chain analysis model can be viewed to provide a method of looking at the business with the main objective being to identify ways in which competitive advantages can be achieved. For example it can be applied to business where the top four sections (a) Firm Infrastructure, (b) HRM, (c) Technology Development, (d) Procurement, in which these are items that add support value of a product as figure 1 show. He mentions that the four main value adding activities such as (a) Inbound Logistics, (b) Operations, (c) Outbound Logistics, (d) Marketing & Sales, (e) Service, are classed as the primary value adding variables (Micheal E Porter, 1986). He uses the supply chain analysis model to examine all activities, looking at whether they are firstly still needed, and then to examine ways of firstly improving efficiency and trying to achieve cost reductions to increase the profit margins for the business.

![Figure 1: Porters Value Chain Model](Adapted from Micheal E Porter, 1986)
VALUE CHAIN INTEGRATION

Another authoritative authors Papazoglou, M.P. & Yang, J (2000) state that a value chain integration is when ‘an enterprise’s business systems can no longer be confined to internal processes, programs and data repositories, rather they must interoperate with other such systems that support links in the supply chain’. Examples of such arrangements include when an organisation’s value chain is transformed into an integrated value systems that may be seen as an ‘extended enterprise’ creating and enhancing customer-perceived value by means of cross enterprise collaboration (Dobbs, J. H. reference in Papazoglou, M.P. & Yang, J, 2000). For example, the use of information systems in electronic data interchange (EDI) among members of a supply chain (Dearing, 1990) and Internet services to link organisations (Kalakoltla and Whinston, 1996).

In order to improve e-commerce transactions, the integrated value chain systems, which were created to support the overall business goal, also support the integrated view of all business elements that cut across departmental boundaries (Papazoglou & Yang 2000). They furthermore indicate that this can be achieved through the utilisation of distributed workflow technology that allows business processes to be shared and passed across the value chain so as to create networks of highly efficient virtual organisations which would be impossible to achieve through the conventional business paradigm. The distributed workflow technology is made up of integrated business functions, application program interfaces, data warehousing and the legacy system (Papazoglou & Yang 2000).

The technology challenges in digital economy and Integrated Value Chain

In this section, I shall turn to take a quick back-to-front tour through the value chain, looking briefly at the technological challenges the new digital economy poses within each link.

For example, Figure 2 below depicts a generic value chain

According to a report by Cambridge Technology Partners (1998), in the digital economy, an enterprise must have the ability to exchange data with suppliers quickly and easily, regardless of format. The report also states that data formats can be based on standards, such as extensible mark-up language (XML) or electronic data interchange (EDI), whereby inbound logistics systems must recognise and understand data originating outside the enterprise, and also replicate and transform it for use in internal and external downstream processes. Having discussed the inbound logistics, the centre of the value chain, which forms the operational activities, will be examined. In this section the added value occurs as they serve as the “back office” in which the PCs are assembled. In the digital economy, all-operational activities can share data at maximum network speed among internal and external partners, thereby executing the value-adding processes (Cambridge Technology Partners’ Report, 1998).

Finally, on the right side of the figure, outbound logistics, sales and marketing, and customers’ service and support are the customer-facing links of the integrated value chain. The report also indicates that in the digital economy, customers are required to have an authorised read-and-update access to enterprise data that will supercede obstacles presented by an operational, internal application silo. In return, the companies can interact with customers through a variety of delivery channels. Consequently, this provides companies with the chance to consolidate, aggregate, and deliver data over the Web and any other outbound channels intuitively and immediately (Cambridge Technology Partners’ Report, 1998).

DISCUSSION OF CASE SCENARIO

In order to investigate the elements influencing the integrated value chain analysis and the critical impact of Internet technologies on creating competitive advantage, a study of a non-profit organisation #A has been undertaken.
Organisation #A is a worldwide movement of people who campaign for human rights. It is independent of any government, political ideology, economic interest or religion and mobilises volunteer activists in more than 140 countries and territories in every part of the world.

To research the question raised above, I have held preliminary discussions with organisation #A’s manager and balance these discussions with the supply chain management literature.

RESEARCH METHODOLOGY

The research methodology for this study was based on an exploratory case study approach. Key players were identified from Organisation #A’s West Australian branch and these individuals (the regional co-ordinator, administration officer and field officer) were interviewed. The interviews were semi-structured and later transcribed.

In addition, informal conversations and documentary evidence was used in order to obtain rich process descriptions of the project. A series of open-ended questions were asked that covered the key areas of:

organisation #A’s strategic plan and how their strategy is translated into critical success factors;
the impact of legacy web-based EDI on organisation #A’s business-to-business e-commerce supply chain; the factors that drove organisation #A integrated value chains analyses and how Internet technologies may effect competitive environment for organisation #A; and perception of satisfaction with a successful e-commerce implementation.

The interpretation of the findings uses a dialectical hermeneutic approach. Hermeneutic is primarily concerned with the meaning of a text or text analogue. Moreover, the role and understanding of the interviewers are interpreted historically, and in terms of social and political structures and includes the contribution of the researcher in the analysis process.

PRELIMINARY FINDINGS

In this study, Porter’s (1985), supply chains analysis will be used as the bases for analysing the case study. The study will also focus on how Internet technologies to effect competitive environment for organisation #A.

SUPPLY CHAIN ANALYSIS

In this section, the strategic insight of organisation #A’s business-to-business supply chain is explored. The findings, as to how the legacy web-based EDI system by allowing large volumes of information to flow across organisational boundaries, may transform the relationship between trading partners by bringing them much closer together with its own departments and groups will also be discussed.

The first part of this section is devoted to exploring the following factors: (1) the nature of markets and distribution channels, (2) the organisational structure and process; and (3) the buyer power influence and the implementation of its legacy web-based EDI integrating with its suppliers, members and customers.

In organisation #A’s case, staff are always exchanging information about their activities with their suppliers, members and customers through business meetings, the exchange of documents, by telephone, telex and facsimiles. This means that legacy ‘EDI may facilitate data warehousing as it is seen to allow large volumes of information to flow across organisational boundaries in a single moment. Legacy EDI also has the potential to transform the relationship between trading partners by bringing them much closer together’ (Holland, C. P, Lockett, A. G, and Blackman I.D, 1992).

In an article by Holland, C. P, Lockett, A. G, and Blackman I.D, (1992), the authors suggest that ‘the general organisation can cover the whole of the supply chain from inventory to customers and for each industry sector the number of stages may vary’.

For example, Figure 3 below depicts the supply chain for organisation #A.

![Diagram of supply chain]

Customer/members
Distribution

Internal Organisational Structure &
New Members, Non
Supplier

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Legacy web-based EDI may be used in many parts of the chain. In this paper, in order to produce a general conceptual solution for organisation # A, the number of stages has been aggregated to three main ones; supplier, internal and customer/members.

These stages allow me to develop a generic scheme that the management team of organisation #A can apply regardless of their position in the chain.

**Supplier-related Channel**

According to Holland, C. P, Lockett, A. G, and Blackman I.D, (1992), the authors states, ‘The strategic EDI model contains several factors such as supplier-related stage, internal operations and customer-related channels, which are important for planning EDI, links with suppliers. In the past, only companies with a dominant market share were able to impose trading terms on suppliers that included EDI arrangements’. However, the trend has changed. This means that now legacy web-based EDI is seen to be becoming more easily and efficiently integrated into Electronic Commerce. In organisation #A’s case, using legacy web-based EDI to do business in the long run would enable them to relinquish its control over its suppliers.