A MODEL FOR SUCCESSFUL IMPLEMENTATION OF INTERNET-BASED ELECTRONIC COMMERCE IN BUSINESS OPERATIONS

by

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CERTIFICATE

I certify that this thesis has not already been submitted for any degree and is not being submitted as part of candidature for any other degree.

I also certify that the thesis has been written by me and that any help that I have received in preparing this thesis, and all sources used, have been acknowledged in this thesis.

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ABSTRACT

A MODEL FOR SUCCESSFUL IMPLEMENTATION OF INTERNET-BASED ELECTRONIC COMMERCE IN BUSINESS OPERATIONS

The dramatic impact of Internet-based electronic commerce is attracting a great deal of attention in the business world. It is a reality that Internet-based electronic commerce is still in its infancy and it will take a few more years or a decade before it becomes a full medium of business operations. However, many long vision organisations are implementing Internet-based electronic commerce (e-commerce) in their business operations in order to be able to cope, survive and obtain competitive advantage in this very dynamic, and rapidly changing global business environment. E-commerce refers to moving business-related operations and transactions from paper-based to a fully electronic (digital) environment over the Internet.

Therefore, as we enter the third millennium, business operations all around the world are starting to move inevitably from the traditional method to the Internet-based electronic commerce. Threat or opportunity, e-commerce over the Internet will change the way we do business. The development of Internet-based e-commerce might be seen as one of the most exciting trends in the business marketplace.

Research shows that almost every organisation that wants to stay in business beyond the turn of the century must re-evaluate every aspect of its strategy and operations from customer service to marketing, product development to retailing, and logistics to distribution and all value-added supply chain business processes. That is why Internet-based e-commerce is essential for companies entering a virtual distribution marketplace to survive in this very competitive business environment.

This study attempts to identify, examine, analyse, test and empirically determine the strategic critical (key) success factors (CSFs) in order to develop a comprehensive

model for successful implementation of Internet-based e-commerce in business operations. CSFs were considered in this research from the perspective of Internet-based e-commerce user companies' executives and managers. There is no previous and specific study on the critical success factors for the implementation of Internet-based electronic commerce at the time of this study.

This research consists of two parts. In order to realise the research purpose, the study employed two Focus Group sessions, a pilot-test (pre-test) followed by a comprehensive quantitative survey. Questionnaires were mailed to CEOs, Directors and IS/E-commerce executives/managers from randomly selected e-commerce user companies in Australia. There was no comprehensive business index available for e-commerce user companies at the time of this research. Therefore, e-commerce user companies were randomly selected from the Internet by using one of the most powerful and popular search engines, Yahoo!

The collected data was examined for validity and reliability. Statistical tests included descriptive analysis, Chi-Square goodness-of-fit, canonical correlation analysis, factor analysis, and regression analysis. *As a result of the statistical analysis, the top ten critical success factors for Internet-based e-commerce implementation success were identified.* The ten CSFs were statistically significant for e-commerce implementation success and supported the proposed original research model.

The expected contribution of this study is to identify and provide knowledge on key or critical success factors for companies who have already implemented or plan to implement Internet-based e-commerce in their business operations. The recommended key strategic success factors for Internet-based e-commerce implementation enables executives, managers or practitioners (implementors) to use effectively and efficiently these strategic factors when planning, developing and implementing an e-commerce business operations system over the Internet. This study also provides a basic knowledge for further research on CSF and e-commerce

implementation. E-commerce user companies may also benefit from the results and may be able to utilise the critical success factors for planning purposes.

Further, this research, like any other research, is subject to a number of limitations. However, this is the first study of its kind as far as the researcher is aware. The findings are clear and significantly supported by statistical analysis. Additional research is however needed for better understanding of this new medium of digital business operations.

Finally, a model was developed to present the most critical success factors for successful implementation of Internet-based e-commerce in business operations. It may be said that the developed model is one of the first developments in this field.

CHAPTER 1

INTRODUCTION

"Doing business electronically, especially with the explosion of the Internet and globalisation, is growing exponentially, however, for Electronic Commerce to be fully accepted in the marketplace, issues of *security, reliability, confidentiality, privacy, liability*, and *accountability* need to be understood and adequately addressed."

André Vallerand, President,
E-Commerce World Institute, http://www.ecworld.org).

1.1 GENERAL

The Internet is the largest single source of information in the world today (SAP, 1997). In other words, the information superhighway or the Internet is one of the most important developments in the history of information systems (IS) and it is also one of the hottest topics in today's business world (Fitzgerald and Dennis, 1996). The Internet, or '*network of networks*' (Schwartz, 1993), has the potential to become a major business medium for commercial enterprises: "*Companies of all shapes and sizes are finding that the Internet provides new opportunities for competitive advantage*" (Cronin, 1993). Many companies, large and small, are already using Internet-based e-commerce to gain an edge in an increasingly competitive dynamic business environment, both nationally and globally (Cronin, 1996; Quelch and Klein, 1996).

According to Youssef (1992), one of the most important factors impending on business operations management today is the reality of *Global Competition*. A key impact of that factor on operations managers is that a country's borders no longer provide protection from foreign imports. Time-based competition has become intense and is increasing. Today, globalisation and global competition, computers and advanced production technology, and social responsibility issues are providing challenges for operations management and are shaping the nature of manufacturing systems for the future (Youssef, 1992).

In order to succeed in global competition, companies must make a commitment to customer responsiveness and continuous improvement toward the goal of quickly developing innovative products that have the optimal combination of exceptional quality, fast and on-time delivery, low prices and costs, and flexibility (Youssef, 1992), which will be realised with Internet-based e-commerce.

The world economy has undergone a radical transformation in the last two decades. Today's companies work in an environment of rapidly changing competitors, technological advances, new laws, managed trade policies, and diminishing customer loyalty. Companies find themselves competing in a race where the road signs and rules keep changing, where there is no finish line and no permanent win. Basically, geographical and cultural distances have shrunk significantly with the advent of jet airplanes, fax machines, global computer and telephone link-ups, world television satellite broadcasting and, nowadays, the beginning of the Information Superhighway or, as widely accepted the Information Age- the Internet (Gates, 1995:95).

Why Internet-based e-commerce? As we are living in a very dynamic and turbulent business environment and approaching to the 21st century, business operations all around the world are beginning to move inevitably from traditional methods to the Internet-based electronic commerce (or e-commerce). Threat or opportunity, Internet commerce will change the way we do business (Kalakota, 1997). The development of Internet-based e-commerce might be seen as one of the most exciting trends in the business marketplace. Almost every organisation that wants to stay in business beyond the turn of the century must re-evaluate every aspect of its strategy and operations from customer service to marketing, product development to retailing, and logistics to distribution (Mougayar, 1997). That is why Internet-based e-commerce is essential for companies entering a virtual distribution marketplace and to survive in this very dynamic and competitive business environment.

Further, research predict that early 2000s and beyond will present both strategic and organisational challenges to business operations management. On the one hand, corporations are being forced to develop strategies that will allow them to be

efficient, responsive, and innovative. On the other hand, they must continue to practice traditional strategic approaches to ensure other aspects of their operations. The global economy is rapidly evolving into an integrated economic system, which presents tremendous opportunities to aggressive global manufacturers while threatening the very existence of the mediocre manufacturer. The competitive strategy has became known as *global chess* and can only be played by companies that message their worldwide operations as interdependent units implementing a coordinated global strategy (Alkhafaji, 1995).

In the days when it was 'business as usual,' companies could succeed by producing their products and supporting them with hard selling and heavy advertising. The fact is today's customers face a plenitude of products in every category. Customers exhibit varying and diverse requirements for product/service combinations and prices. They have high and rising expectations of quality and service within a limited time. Therefore, today's winning companies are those who succeed best in satisfying, indeed delighting, their target customers.

For that reason, companies both in Australia and abroad have recently been in a fiercely competitive race against time, quality, and price. It is a race to respond faster to customers while reducing costs and improving quality. It is a race in which the only winning strategy is "*do it right the first time*." To compete successfully, the companies must know exactly what is happening not only in their neighbourhood but also in the world, and be able to act on it very quickly and smartly. *The closer to real-time this information is collected, the better the company's ability to compete and respond.*

According to Youssef (1992), as we enter the next decade, companies must dedicate themselves to continual, rapid improvement in quality, response time, flexibility, and value. That is, all customers want ever-better quality, ever-quicker response, ever-greater flexibility, and ever-higher value. Quicker response time includes time to market, supply-chain reaction time, flow time through the support offices, cycle time through the plant, delivery time to the external customer, and service recovery when

things go wrong. To effectively reach customers, companies must focus on aligning performance measures with quality, speed, flexibility, and value.

Today, many company executives recognise the significance of response time as a competitive weapon but are struggling to achieve world-class speed (Youssef, 1992). *Internet-Based Competition* is for them (Soliman and Gide, 1997). Not all managers, recognise how Internet-based competition already pervades the industries in which they compete. In the current autoclave of world-class competition, the speed with which a firm can deliver a product or service to market has emerged as the dominant competitive factor.

According to Blackburn (1992), when all the leading companies in an industry have achieved high levels of quality, a focus on quality alone will not attract new customers. A faster response time must complement quality. Today's and tomorrow's customers want it all: *price*, *quality*, and *timely delivery*. Marketing strategists advise firms to get closer to the customer- that is, learn what the customer needs and meet that need as quickly as possible. Because customers desire instant gratification for many products and services, reducing the time required to reach the customer must play a major role in a firm's competitive strategy.

Internet-based competitors focus on the bigger picture, on the entire value-delivery system. They attempt to transform an entire organisation into one focused on the total time required to deliver a product or service. Their goal is not to devise the best way to perform a task but rather to either eliminate the task altogether or perform it in parallel with other tasks so that overall system response time is reduced. Becoming an Internet-based competitor requires making revolutionary changes in the ways processes are organised.

In addition to that, not only internal business processes but also external logistical infrastructure needs to be changed. Business companies require new supporting infrastructures to compete successfully in quickly changing global markets demanding flexibility and timely delivery. According to the experts, the business

solution of the future seems to be the use of Internet-based e-commerce. That is why Internet-based competitors must use electronic commerce to derive performance and competitive edge.

Moreover, information technology (IT) and information systems (IS) enabled technologies like the Internet and its applications, such as e-commerce, continue to proliferate in business organisations and their operations all around the world. Billions of dollars are spent each year to purchase and maintain information technology in the workplace. The dramatic impact of Internet-based e-commerce is attracting a lot of attention, most of which is directed towards emerging Internet technologies. However, it is generally acknowledged that Internet-based e-commerce is still in early stages and it will take a few more years, "*...certainly not before the year 2000- before Internet e-commerce is in the mainstream of the global economy. And it will take at least another decade after that before it becomes a truly significant factor in terms of total commerce*" Stuck (1996, p. 54).

The Internet has become an important medium for organisations desiring to interact with a wide range of stakeholders. It has the potential to market products and services to prospective customers, to communicate information to a global community, to provide an electronic forum for communications, and to process business transactions such as orders and payments (Nash et al., 1998). These activities have come to be known collectively as Internet or electronic commerce – the process of conducting commerce or business electronically over a variety of networks that constitute the Internet.

An interesting Internet user profile was done by O'Reilly & Associates (citation: net. Genesis Corp., 1996). This survey looked at the use of the Internet by commercial users based on the number of employees in their companies (Table 1.1). According to Table1.1, the two largest groups of commercial users are those working in companies with fewer than 50 employees and those working in companies with over 10,000 employees.

Table 1.1 Internet Use by Commercial Users Based on Number of Employees

Number of Employees	Percent of Total Commercial Internet Users
<50	19%
51-100	7%
101-250	7%
251-500	9%
501-1,000	8%
1,001-5,000	16%
5,001-10,000	8%
>10,000	25%

Source: net.Genesis Corporation, 1996

Through the use of digitisation, business transactions can be transmitted virtually instantaneously around the world. This has significant implications for international trade and the management of information. In the words of Buckeridge (1996, p. 60), "*The introduction of the new digital technologies elevates 'information' to its status as the predominant currency of post-industrial societies. This is eroding fixed notions of sovereign nation space, organisational structure, zones of production and marketing, and work processes.*"

Tapscott (1996) describes the 1990s as the '*the age of networked intelligence.*' He suggests that the decade be not simply about the networking of technology but about the networking of humans through technology. "*It is not just an age of linking computers but of internetworking human ingenuity. It is an age of vast new promise and unimaginable opportunity.*" (p. xv) However, he also express a warning. "*For individuals, organisations, and societies that fall behind, punishment is swift.*" (p. xv)

For those reasons, Internet-based e-commerce started to attract large attention, especially over the last two years from banking to manufacturing industries because of its promise of reducing the cost of operations (COS) and just-in-time (JIT) applications (Cronin, 1996). Internet-based e-commerce is rapidly emerging as an entirely new method to conduct business and interact with customers, suppliers and partners.

The main drivers for business implementation of Internet-based e-commerce are as follows:

- The new world order, ending the Cold War threat,
- Globalisation and its effects,
- New developments in international (tele)communication technologies and infrastructures,
- The easy and cheap availability of Internet technologies (hardware and software),
- The flexibility and friendliness of Internet technologies (Web, e-mail, browser, search tools, etc).

Today, Internet-based e-commerce is clearly becoming an imperative for the internetworked enterprise. E-commerce covers all aspects of buying/selling relationship cycle and activities surrounding it. E-commerce also covers the digital value establishment and production process. The business-to-business and business-to-consumer segments of e-commerce contain both common and differing characteristics that must be understood to succeed in a given implementation. Figure 1.1 shows an estimation for global e-commerce sales volume (1995-2005) (source: www.ecworld.org).

The value of goods and services traded between companies over the Internet is expected to skyrocket from $8 billion in 1997 to $327 billion in 2002, according to the inaugural report from Forrester Research's Business Trade & Technology Strategies Service (http://www.internetnews.com/ec-news/cur/1997/07/3005-bb.html).

In quantifying the potential of Internet commerce, Forrester researched the Electronic Commerce plans of 150 companies covering 12 major industrial categories. In-depth interviews were then conducted with executives at 63 of the businesses found to be actively trading goods and services over the Internet. Additionally, executives at 25 major suppliers of Internet commerce software, services, and systems integration were interviewed.

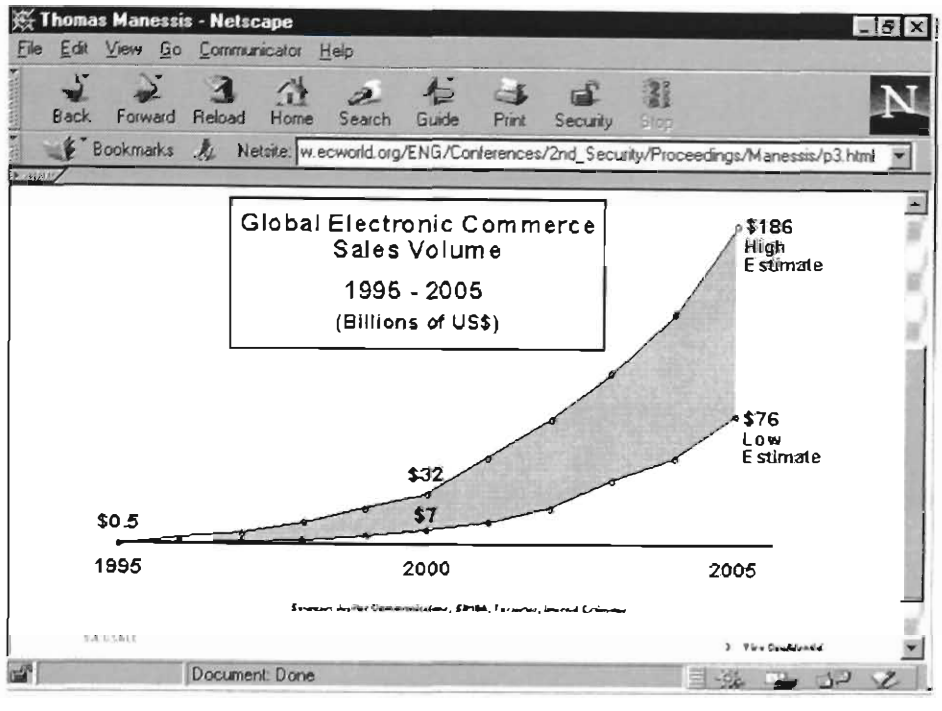

Figure 1.1: Global E-Commerce Sales Volume (1995-2005) (source:www.ecworld.org)

According to the same report, businesses are aggressively adopting inter-company trade over the Internet because they want to cut costs, reduce order processing time, and improve information flow. For most firms, the rise in trade over the Internet also coincides with a marked decrease in phone and fax use, allowing salespeople to concentrate on pro-actively managing customer accounts rather than serving as information givers and order takers.

Internet marketing research firm ActiveMedia (1997), citing its ongoing study of online marketers, said its latest projection indicates that global Web sales through 2002 could total $1.5 trillion, or about 3% of combined GDP for all countries worldwide. The study tracks eight Web business segments: manufacturing, computers and software, business/professional, consumer, travel, investment/finance, publishing, and real estate. According to Business Week (June 22, 1998), businesses are ahead of consumers in embracing the Internet. Even the slow-growing business markets are bigger than fast-growing consumer sectors. The table below (Table 1.2) shows some realities in how Internet-based e-commerce getting momentum and changes traditional commerce.

Table 1.2: Business and Consumers E-Commerce on the Internet (Source: Forrester Research Inc. and Business Week, 1998).

	EARLY ADOPTERS	LATER ADOPTERS
BUSINESS	**Durable Goods:** Led by makers of computers and other high-tech hardware, more than 43% of durable goods manufacturers will conduct business-to-business commerce over the Internet by 2001, with sales reaching $99 billion.	**Services:** Doctors, lawyers, and accountants generally provide their services in person-one reason the sector will be slower to adopt E-Commerce. Projected sales by 2001, $19 billion.
	Wholesaling: Companies that wholesale office supplies, electronic goods, and scientific equipment are embracing the Net. Projected sales by 2001: $89 billion.	**Transportation:** Most transportation companies are already committed to the alternative known as electronic data interchange (EDI). Internet sales by 2001 might be only $300 million.
CONSUMER	**Travel:** Flyers are bedevilling agents by browsing the Internet for bargain fares. Sales in 2001: $7.4 billion.	**Housing:** The Internet is a great place to browse for houses, apartments, and mortgage loans, but transactions are still being done the old-fashioned way (security reasons!).
	Computer Hardware and Software: It is an ideal sector for E-Commerce. Buyers tend to be Net-savy, and you don't need to sniff, squeeze, or try on the merchandise. Forecast sales in 2001, $3.8 billion.	**Food:** Supermarkets won't be closing their doors anytime soon. Projected sales for 2001: $460 million-less than gifts, flowers, and greetings
	Books, Music, and Entertainment: This is a sector where on-line purchases may raise total spending, not just cannibalise sales from brick-mortar merchants. Forecast sales in 2001: $3.8 billion.	**Services:** Tele-medicine notwithstanding, health care is still a face-to-face business. Same goes for other services-except computer updates and fixes, which are an on-line natural.

On the other hand market research firm Paul Kagan Associates released 10-year revenue projections for the interactive media industry, saying that in 2007, it expects Internet-related income to be $46 billion, having risen from a projected $11.1 billion for 1997, as consumer trust in on-line security rises and convenience afforded by on-line transactions increases. Moreover, with Internet commerce already headed for $8 billion in 1997, up 1,000% from 1996, Forrester looked at which industries are at the centre of the dramatic growth. Three different company types were identified: manufacturers, chiefly in electronics and airplane parts, represent 38% of all Internet business in 1997, a total of $3 billion; middlemen, computer-related and office supplies, total $2 billion in 1997; and services and utilities, total $3 billion.

According to a recent survey conducted by market research firm IDC Asia/Pacific (July 1998), 75 percent of the largest 1,000 companies in Asia, ranked by sales revenue, have established a presence on the World Wide Web. The figure represents a 57 percent rise since the last survey was conducted in October 1997. According to IDC, in comparison, 81 percent of U.S. companies with more than 100 employees have Web sites (Web Vision, India; July 4, 1998).

No matter the number is becoming bigger and bigger as shown above, the reality is that, the effective exploitation of the Internet for e-commerce is dependent upon the ability to effectively manage a range of critical success factors. These appear to be well recognised in literature, and include information technology (IT), communications infrastructure, information security, application development tools, e-commerce management (Society for Information Management, 1997), reliability and privacy (Camp and Sirbu, 1997); and network bandwidth and security (Sim and Rudkin, 1997).

While much attention is currently being devoted to solving technological challenges, for example increasing the bandwidth on existing narrowband network platforms to overcome bottlenecks (Buckeridge, 1996)), no or little attention appears to be given to the critical success factors (such as executive support or employee motivation or acceptance of new technology) of e-commerce implementation. By focusing on the critical success factors early in the implementation of electronic commerce, organisations will have the opportunity to avoid the mistakes made in the past. Since the availability of required information and knowledge is limited with the introduction of a new information technology (like Internet), this often causes information systems (like e-commerce) to fail (Saucer, 1993; Beynon-Davies, 1995).

Information systems managers and corporate management, faced with an increasingly uncertain and challenging business environment, are looking toward information technology (IT) to help them compete more effectively. Management must be able to justify its investments in Internet-based e-commerce – both before the investment decision is made and after the technology has been implemented.

However, there is no comprehensive model to help guide management in this very difficult justification and/or evaluation process.

Business organisations' increasing reliance on Internet-based e-commerce as a means to help them compete effectively in a turbulent environment emphasises the need for ways to take into consideration the strategic success factors when implementing Internet commerce. This first comprehensive model of its kind will provide corporate managers with assistance in evaluating their massive investments in Internet technologies by providing a means of key implementation strategies of that technology.

The next sections presents a statement of the problem, objectives of the study, a brief description of the proposed research model, research hypotheses, research methodology, significance of the research, and the organisation of the chapters.

1.2 STATEMENT OF THE PROBLEM

It is clear when reading both academic and practitioner literature that the Internet-based e-commerce is a very important phenomenon which has grown exponentially since the middle of the 1990s. Although Internet-based e-commerce has been recognised as an important business operations medium for the near future it has not always been an unqualified success.

Cronin (1996), Mougayar (1997), and Kalakota (1997) stated that nearly half of the Internet-based E-Commerce implementation projects do not achieve the goals set out for them. However, they suggested that the failure rate will decrease over time, as research, experience and education about Internet-based e-commerce is grown.

As an example, according to www.consult (1998), a research firm surveyed 1,000 commercial Internet user companies in Australia and discovered that more than 55 per cent were making either negative returns or zero returns on their investment. Only 6.5 per cent claimed a return of 50 per cent or more.

Another example is from Gartner Group's survey of the top 4,000 IT users in Australia revealing small returns for business via the Internet/e-commerce in 1998. Companies expected to earn just 1 per cent of revenue on-line and see just 2 per cent of transactions going on-line this year. But they expect that to jump to 18 per cent of revenues and 26 per cent of transactions by 2003, when it predicts the mass of consumers will arrive.

On the other hand, in the nearly three years since Internet-based e-commerce first commenced with the Web (WWW) discovery as a revolutionary new medium of commercial business operations, there has not been any comprehensive research found on the critical success factors at the time this research began (September, 1996). Much has been written over the past fifteen years on the effects of information technology on organisations, but nothing has been published on the critical success factors of Internet-based e-commerce implementation. There have been only a few studies examining the impact, benefits, general issues and problems of e-commerce.

Questions about what are the important success factors before, during and after the implementations, how important management support is in implementing e-commerce, or how organisational effectiveness or the organisation's technical competency effects the success rate when implementing the Internet-based e-commerce are still lacking. *This suggests that the understanding of Internet-based e-commerce implementation process or practices is limited and research is needed.*

Therefore, a *major problem with today's Internet-based e-commerce implementation is that little is known about factors that contribute to its success mainly because of its newness and a lack of theory and universal business model.* In the past few years, based on Mougayar (1997), and others, organisations have tended to implement Internet-based e-commerce with the limited knowledge and theory. Kalakota (1997) argues that not all Internet-based e-commerce system solutions are suitable for e-commerce implementation success. Selection of the wrong e-commerce system solution for e-commerce implementation can result with disappointment and system failure (Mougayar 1997; Kalakota and Whinston, 1997).

According to the many e-commerce experts who have shared their experience of the Internet-based e-commerce implementation process, it is difficult to estimate the hidden cost or the staff's attitude toward e-commerce implementation. Several e-commerce experts also argue that Internet-based e-commerce implementation carries opportunities (eg. cost and time saving, business process improvement) as well as risk (eg. security, privacy, reliability, cost of investment, re-engineering business operations, etc.) (Kalakota and Whinston, 1997).

Thus, identifying critical success factors (CSFs) for Internet-based e-commerce implementation can help promote the success of e-commerce implementation as well as minimise the risks associated with the failure. Therefore, the main purpose of this study is to identify and analyse the most critical success factors in order to be able to develop and construct a reliable model for successful implementation of Internet-based e-commerce in business operations. Based on the findings, an effective strategy for businesses to proceed with the e-commerce implementation process is proposed. The author of this research hopes that the findings are of interest to both the academics who engage in Internet-based e-commerce implementation research and business communities as well.

1.3 OBJECTIVES OF THIS RESEARCH

The main objective of this research study is to investigate and develop a model for successful implementation of Internet-based e-commerce in business operations. In this thesis, the author examines the most critical success factors for Internet-based e-commerce in order to establish a model for its successful implementation in an organisation no matter how big or small the company's size.

Implementation items will be examined with the aim of finding a set of critical factors that will increase the chance of success when e-commerce implementation is occurred in business operations. It is envisaged that this will lead to understanding the rules and/or conditions for maximising the benefits from employing e-commerce in business operations. The recommended key strategic success factors for Internet-

based e-commerce enables executives/managers and practitioners (implementors) to use effectively and efficiently these strategies when developing and planning for Internet-based e-commerce implementation in their business operations.

Therefore, *the main objective of the present study is to operationalise a model to identify the strategic critical success factors for successful implementation of Internet Based e-commerce in business operations.* So, the main objective will be realised within three steps as below:

1. *The first step is to identify possible critical success factors from the academic literature and published experience of e-commerce executives/managers.* The critical factors which are identified should help those interested in Internet-based e-commerce implementation projects, such as directors/managers, in strategies to ensure more successful e-commerce implementation in business operations. Successful e-commerce implementation has the potential to improve the productivity of an organisation through its ability to respond and adapt to a rapidly changing and intensely competitive environment (Laudon and Laudon, 1997; Kalakota, 1997; Cronin 1996).

   Critical success factors (CSFs) are the factors that constitute the critical or fundamental components of the system (Rockart, 1979). They are the key areas where "*things must go right*" (Rockart 1979). In other words, if these components fail, the system fails. During a period of Internet-based e-commerce implementation, e-commerce managers should recognise and identify these crucial components. Thus, identifying strategic critical success factors can help IS (for example, e-commerce) executives and others develop organisational strategies, tactical plans, and operational plans that facilitate organisational effectiveness (Rockart 1979 and 1982). Internet-based e-commerce is a special type of information systems (IS). It means, published material in the IS implementation field is quite relevant to identify some of the critical success factors for Internet-based e-commerce implementation. Therefore, successful e-commerce implementation has the potential to improve the productivity, cost and

time effectiveness of an organisation. This will ultimately be used to increase its response and adaptation to a rapidly changing and intensely competitive environment.

2. *The second step is to study actual Internet-based e-commerce implementation practices and provide a possible empirical foundation to extend the existing limited knowledge of strategies for e-commerce implementation success.* Empirical studies on the Internet-based e-commerce implementation success phenomena have not been found at the time of this study. Previous empirical literature has studied measures for information systems (IS) implementation success but none for e-commerce implementation success. Since e-commerce is a type of IS, using some examples of the IS implementation success measures are quite relevant for the model foundation. Some examples of the IS implementation success measures are: user information satisfaction (Ives, Olson and Baroudi 1983), system utilisation, decision effectiveness, organisational performance (Ives, Hamilton, and Davis 1980) and critical success factors for information needs (Rockart 1979). Therefore, this study applies a strategic approach to identify critical factors for successful implementation of Internet-based e-commerce in business operations.

3. *The third step is to develop a model that might predict Internet-based e-commerce implementation success by utilisation of critical factors.* The CSF approach, to help executives define their significant information needs, was first suggested by Rockart (1979). Later, scholars extended this concept to predict the risks or the critical factors of IS implementation success (Brancheau 1996; Miles et al. 1995; Grover et al. 1995; De Lone and McLean 1992; Montazemi 1988; Magal et al. 1988; Yaverbaum 1988; Miller and Doyle 1987; Lyytinen 1987; Ives and Olson 1984; Ferguson 1982; Martin 1982, etc.,). Based on these studies, it appears that the CSF approach could help e-commerce executives/managers in analysing, predicting and communicating the content of Internet-based e-commerce implementation more accurately.

Briefly, this research examines and analyses the key factors for successful implementation of Internet-based e-commerce in business operations. The identified key success factors for e-commerce enables executives/managers and professionals to use effectively and efficiently these results when developing and planning for e-commerce business implementation.

Finally, although several authors have published articles dealing with critical success factors (CSFs) or Internet-based e-commerce, none have combined the two. This study fills that void by combining both critical success factors (CSFs) and Internet-based e-commerce implementation theory and research.

1.4 RESEARCH MODEL

Since there have not been published work found on CSF study of Internet-based e-commerce implementation in the literature at the time of this study, the proposed research model uses some of the important, well known and internationally recognised previous critical success factor studies in information systems (IS). Such as the CSF study of Rockart (1982), modified according to the study of Martin (1982), DeLone (1988), Miller et al. (1987), and Bergeron et al., (1993) etc. Figure 1.2 shows the proposed conceptual research model.

The independent variables (predictors) in this model can be categorised into the following ten key areas that might determine the major critical success factors:

1. Top management commitment and support for e-commerce implementation,
2. Communication, training, and facilitation between e-commerce department and users,
3. User appreciation of e-commerce system,
4. E-commerce department's service function,
5. Integration of e-commerce with organisation's existing business functions,
6. Organisational effectiveness for e-commerce system,
7. Change management (managing technological and organisational change),

8. Internet/e-commerce system security and reliability,
9. Technological competence for e-commerce, and
10. E-commerce system applications.

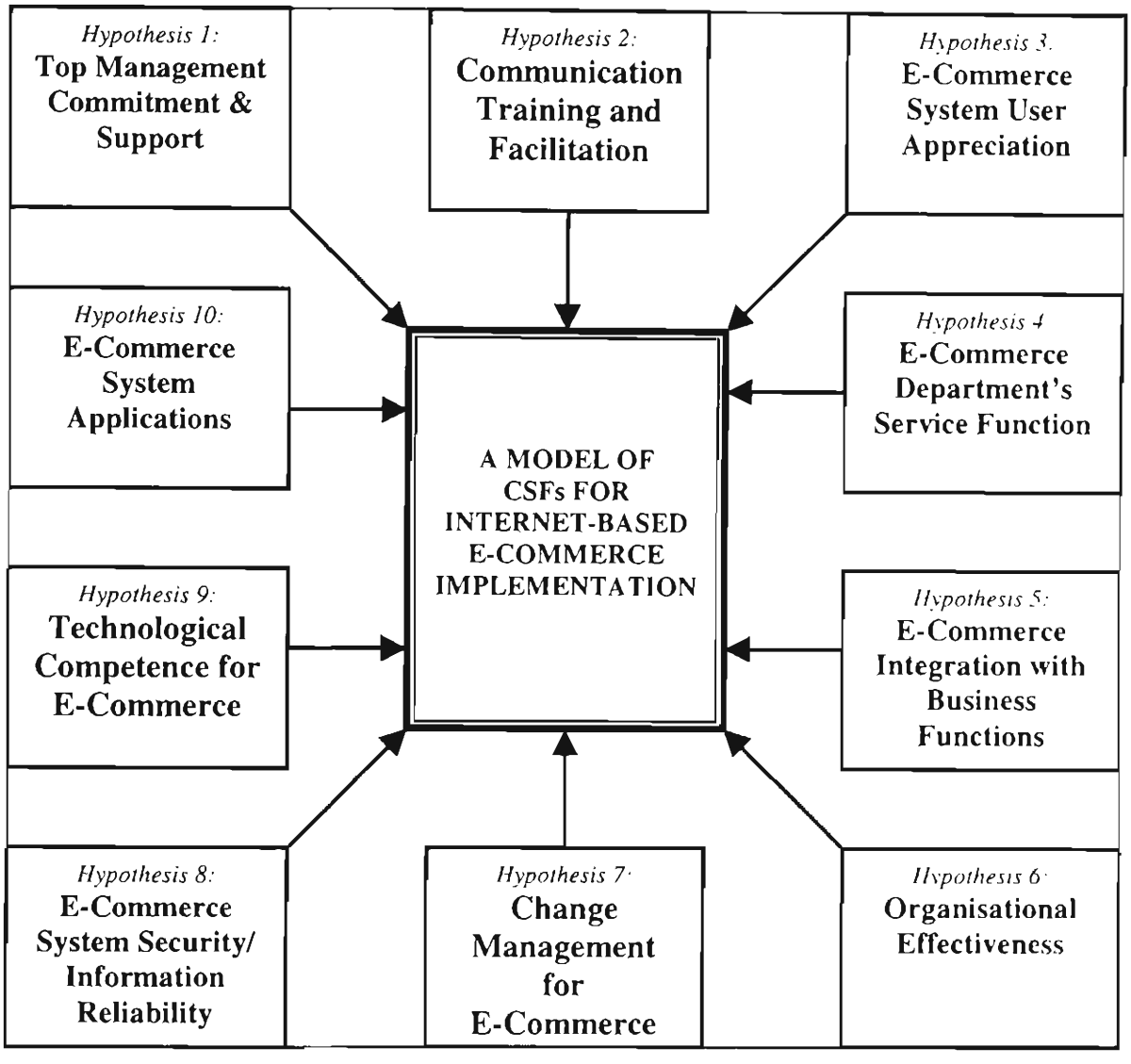

Figure 1.2: The Proposed Conceptual Research Model and Hypotheses for Successful Implementation of Internet-Based E-Commerce

The proposal of this study is that those ten factors will be related to the strategic success of Internet-based e-commerce implementation in Australian businesses as defined by Internet and e-commerce executives and managers.

In this model, there are also twelve dependant variables (criterion) to measure e-commerce system performance (success) that resulted from successful Internet-based

e-commerce implementation based on e-commerce user company executive's and manager's perspective:

1. Improved system availability, flexibility and usefulness,
2. Simplified and streamlined business processes,
3. Improved speed of product/service cycle,
4. Improvements in product/service and information quality,
5. Time savings in business operations and management,
6. Cost savings in business operations and management,
7. Improved overall productivity and efficiency of the users,
8. Improved internal/external communications and relationships between users and management,
9. Higher user/customer satisfaction,
10. Increased sales, revenues and market share,
11. Enhanced competitive advantage, and
12. Improving effective decision making and empowerment of users.

This research assesses the evolution of e-commerce implementation and provides a useful starting point. Therefore, criterion were collected and analysed; and the seemingly appropriate strategies for implementation of e-commerce in the literature were obtained.

The variables were extracted from the related literature examined in Chapter 3. In addition, Chapter 4 will provide a detailed description of the hypotheses. A brief discussion of hypotheses follows.

1.5 STATEMENT OF RESEARCH QUESTION AND HYPOTHESES

The importance of Internet-based e-commerce and the resultant implementation impact on an organisation's performance are the main aims of the hypotheses. The power and influence of e-commerce has to be also established. However there have not been any comprehensive academic studies/surveys attempting to clarify the link

between the critical success factors and implementation success of the Internet-based e-commerce at the beginning of this study.

Therefore, the purpose of this research study is to identify the strategic critical success factors to develop and test a comprehensive model for successful implementation of Internet-based e-commerce in business operations regardless of the company size and industry type. The research addresses the following question:

Can a model be developed to identify the critical success factors for successful implementation of Internet-based e-commerce in business operations?

Several steps are necessary to answer to the research question:

The first step is to thoroughly review the literature for existing theories pertaining to key success factors for implementation of IT/IS/e-commerce that have been developed, validated, and utilised in previous studies.

The second step is to develop and operationalise the CSF model, based on the findings in the literature. The subsequent empirical testing of the relationships in the model provides the final step in answering the research question. *The researcher of this thesis put every effort to collect any valuable information regarding to CSF studies for implementation of Internet-based e-commerce, but no single research study was found at the time of this research.* This was an expected outcome by the researcher since Internet-based e-commerce is still in infancy stage and in the commercial markets for only a few years. However, to incorporate with previous studies and some kind of justification of the model, IT/IS related critical success factor studies have been used as a stepping stone to build an initial tentative model (such as, Rockart 1982, Martin, 1982, and Miller 1987). Literature reviews of existing measures of IS success have been conducted by Zmud (1979), Ives and Olson (1984), DeLone and McLean (1992), and more recently by Cavaye and Cragg (1995).

In this study, ten sets of hypotheses are defined and then tested to support or otherwise the proposed research study. The variables were carefully extracted from various IT/IS and Internet-based e-commerce related literature as a result of very extensive research time and effort. The hypotheses are briefly as follows:

1. The 1st hypothesis proposes that the commitment and support from top management and users will impact on the e-commerce implementation success. The key to successful implementation of Internet-based e-commerce is top management's deep and lasting commitment and support. Without support from the top management and their willingness to make investments, it is impossible for e-commerce projects to be approved. Because top managers have a strategic point of view, it may be easy to convince them to buy long-term benefits of the e-commerce system. Top management and users who actively participate in the e-commerce implementation planning process will understand the e-commerce implementation concepts better and will be more likely to support e-commerce implementation. Their commitment and support for e-commerce implementation will impact the success of e-commerce implementation.

   Hypothesis 1: *Commitment and support from top management and users are related to Internet-based e-commerce implementation success.*

2. The 2nd set of hypotheses implies the importance of communication, training and facilitation between users and the e-commerce department. Even with the management commitment and technical feasibility, Internet-based e-commerce implementation may not achieve the intended goals if people related to the e-commerce system are not ready for it. By addressing the management training needs early, one is able to better understand and absorb how to take advantage of the Internet and e-commerce effectively. The best decisions are taken by the most informed managers. The coordination function of an e-commerce department will effect users' attitudes and their participation in implementation. Through communication and coordination, an e-commerce department can provide and support appropriate training and facilities to users.

Hypothesis 2: *Communication between users and the e-commerce department is related to Internet-based e-commerce implementation success.*

Hypothesis 2a: *Training and facilitation to users is related to Internet-based e-commerce implementation success.*

3. The 3rd set of hypotheses implies a positive relationship between user appreciation and Internet-based e-commerce implementation success. User appreciation includes user involvement or user participation, user satisfaction, and user's favourable attitude toward e-commerce implementation.

Hypothesis 3: *User appreciation is related to Internet-based e-commerce implementation success.*

Hypothesis 3a: *Users involvement in the process of e-commerce system implementation is related to Internet-based e-commerce implementation success.*

Hypothesis 3b: *Users' attitude toward e-commerce system implementation is related to Internet-based e-commerce implementation success.*

4. The 4th hypothesis suggests an e-commerce department should provide required services and system applications to users. From the e-commerce department's service function perspective, the important keys to Internet-based e-commerce implementation success are training (ie. how to use Internet/e-commerce system tools), providing useful services (ie. organisation's staff needs and wants); and enabling tools (ie. providing information access tools to the customers). An e-commerce department should also have competent staff that supports e-commerce services and consulting. An e-commerce department should provide

training courses to users for updating e-commerce knowledge and skills applicable to implementation.

Hypothesis 4: *The quality of support services of an e-commerce department is positively related to Internet-based e-commerce implementation success.*

5. The 5th hypothesis suggests that e-commerce system integration is related to Internet-based e-commerce implementation success. E-commerce is about putting all the pieces together - internal and external business processes and management. Establishing a Web site is a good start for conducting business on the Internet however, it is not the final step for solution. The goal - what e-commerce really means for business - is the integration of processes that span companies, geography, and business functions. For virtual and traditional companies alike, the successful implementation of e-commerce depends on the ability of integrating internal e-commerce business operations with suppliers, business partners, distributors and loyal customers all along the supply chain. For companies, integrating an e-commerce system with supply chains is a critical part of realising full benefits of e-commerce.

Hypothesis 5: *Integrating e-commerce system into an organisation's existing business functions is related to Internet-based e-commerce implementation success.*

6. The 6th hypothesis suggests that there is a relationship between organisational effectiveness and e-commerce implementation success. Any management task should be designed to achieve the organisation's objectives; similarly, Internet-based e-commerce implementation should be designed to achieve an organisation's objectives. Companies need to be absolutely clear on their objectives for an e-commerce system implementation project. Building any kind of e-commerce system requires a strategy and a vision of the goal to achieve. As a new business medium and sales channel, a successful e-commerce business

must be treated with the same rules, policies and strategies as any physical one. Without an appropriate strategy, having a Web site on the Internet does not automatically make a company a success, nor does it make customers appear. Success in Internet-based e-commerce does not have to do with a company's Web site only, but more importantly it will depend on how a company strategically positions its products and services via other e-commerce communities and intermediaries, as well as how a company facilitates its interactions with customers, suppliers and business partners. On the other hand, as e-commerce implementation supports organisational objectives and priorities, organisational performance and managerial decision-making will be improved.

Hypothesis 6: *Organisational effectiveness is related to Internet-based e-commerce implementation success.*

7. The 7th hypothesis proposes that there is a relation between change management and e-commerce implementation success. Change management includes technological, structural and cultural changes. The reasons and expectations for the change should be communicated organisation-wide as a way of motivating people and enticing them to commit themselves to the implementation. Human resources and organisational restructuring issues are also related to change management.

Hypothesis 7: *Change management is related to Internet-based e-commerce implementation success.*

8. The 8th set of hypotheses proposes that Internet-based e-commerce implementation success is related to Internet/e-commerce system security and reliability. This includes company network and data security, transaction security and reliability, payment security, confidentiality and privacy of users, customers, suppliers and business partners. Research shows that network, data/message, Internet, e-commerce and Web application securities are some of the most challenging factors faced by companies which wish to implement Internet-based

e-commerce. In order to realise successful e-commerce implementation, e-commerce systems must be secure and reliable. If Internet users do not have confidence that their communications are safe from unauthorised access or modification, they will be unlikely to use the Internet on a routine basis for commerce. Therefore, conducting e-commerce over the Internet has to be completely secure and reliable.

Hypothesis 8: *E-commerce system security and reliability is related to Internet-based e-commerce implementation success.*

Hypothesis 8a: *E-commerce system security is related to Internet-based e-commerce implementation success.*

Hypothesis 8b: *E-commerce system reliability is related to Internet-based e-commerce implementation success.*

9. The 9th hypothesis suggests that technological readiness and access to technical competence is important for successful implementation of an Internet-based e-commerce system. Technological competence is related to the existence and use of the organisations' information technology infrastructure in terms of hardware, software, and human resources components which supported or enabled the implementation of an Internet-based e-commerce system. When an Internet-based e-commerce system implementation level is decided, the technological competence should be evaluated because it has a direct influence on the organisation's ability to implement, maintain and utilise an e-commerce system, and whether the potential competitors and business partners can use it. Organisational and technical factors like the skills of personnel, internal training, work procedures and routines, workload and process flexibility show the technical competence of an organisation, and could predict the e-commerce utility for the organisation.

Hypothesis 9: *Technological competence is related to Internet-based e-commerce implementation success.*

10. The 10th set of hypotheses is related to the study of the effect of appropriate e-commerce system applications including software for e-commerce implementation. Applications should not only meet business but also customer, supplier, and business partner requirements; and be easy to use, maintain and update instantly. According to the literature, one of the biggest attractions of the Internet and Internet-enabled services such as e-commerce is flexibility and ease of use. That is why one of the key factors for the implementation success of e-commerce is to offer ease of use through Web applications. Appropriate system applications should meet the criteria of superior information quality, reliability, efficiency, flexibility and adequacy.

Hypothesis 10: *An appropriate system application is related to Internet-based e-commerce implementation success.*

Hypothesis 10a: *The quality of an e-commerce system application is related to Internet-based e-commerce implementation success.*

Hypothesis 10b: *The efficiency of an e-commerce system application is related to Internet-based e-commerce implementation success.*

Hypothesis 10c: *The flexibility and adequacy of an e-commerce system application is related to Internet-based e-commerce implementation success.*

In testing the hypotheses, the critical (key) success factors that are related to Internet-based e-commerce implementation success are identified and explained. It is hoped that such a model will provide guidance to organisations that want to implement Internet-based e-commerce technologies in their business operations.

1.6 RESEARCH METHODOLOGY

In order to match the methodology with the issue that is being investigated, the researcher of this study has selected as working tools a combination of research methods. CSF analysis is used to analyse the proposed model and the empirical data.

This section briefly discusses the sample subjects, research instrument, and data analysis. A more detailed discussion can be found in Chapter 5. Figure 1.3 depicts the research flow-chart of this method.

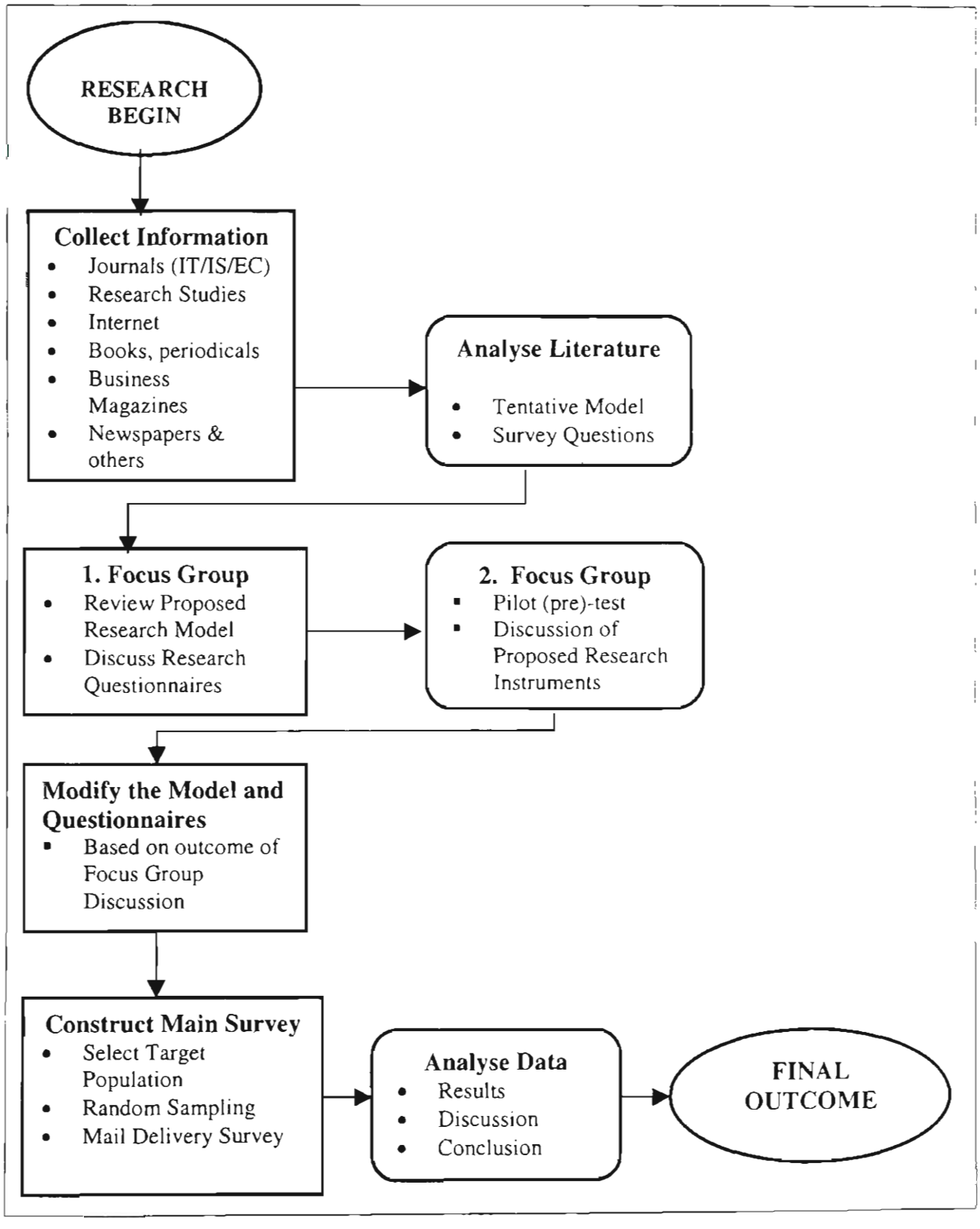

Figure 1.3: Step-by-Step Research Study Flow-chart

▫ Sample Subjects

This study consists of two Focus Group sessions, a pilot (pre)-test and then a comprehensive mail survey. There have been two separate Focus Group interviews conducted prior to a main questionnaire survey. The first one was prior to questionnaire preparation. 1st Focus Group meeting has been realised in order to discuss the proposed research model, methodology, and possible implementation success factors from the experts and practitioners' point of view.

After that, a pre-test (pilot-test) was conducted with the 2nd Focus Group participants prior to meeting with them. Then, the 2nd Focus Group meeting was conducted to fine-tune the final research instrument. According to Sekaran (1992) and Zikmund (1997), *Focus Groups are appropriate when the concepts being investigated are relatively new (like Internet-based e-commerce) or diffuse and careful qualitative work is needed before structured, questionnaire-based research can be taken.*

Then a comprehensive mail delivery survey conducted. Questionnaires were mailed to 530 Internet-based e-commerce user companies (to be replied by Internet/e-commerce executives/managers) in Australia selected randomly from the Internet, using one of the most powerful and popular Internet search engines, Yahoo! In this study, any organisations that are using Internet-based e-commerce as a supplement to the traditional business operations were considered. Due to the relatively new field of Internet-based e-commerce, very large samples are not possible for this research. There were no business indexes available for Internet-based e-commerce user companies in Australia at the time of this research. Therefore Internet-based e-commerce user companies were randomly selected from the Internet by using one of the most comprehensive search engines, named Yahoo! Inc.

E-commerce executives/managers were chosen as the subjects because of e-commerce managers' professional qualifications and experiences, and their professional interest in Internet/e-commerce. In addition, several empirical studies have found a positive relationship between IS implementation success and IS executives/managers' perceptions. In this respect, Internet/e-commerce executives/

directors/managers are asked to respond to items pertaining to their individual perceptions of e-commerce implementation. These items identify such elements as the level of user and customer satisfaction, and the organisational impact of Internet commerce, including operational performance, information quality and security, reliability, flexibility, efficiency, and organisational changes to name a few.

- **Research Instrument**

The questionnaire is designed in four parts:

1. The first part contains seven questions designed to identify Internet-based e-commerce implementation trends and satisfaction.

2. The second part is composed of 12 variables measuring Internet-based e-commerce implementation performance results based on e-commerce executives/managers' perceived evaluation. These items are based on, or obtained from, the recent literature. *Appendix-A* shows where the research items are identified and obtained in the literature.

3. The third part is designed to identify Internet-based e-commerce implementation activities that influence e-commerce implementation success (performance). This part is composed of 88 items. *Appendix-A* also shows how these variables were identified in the literature.

4. The fourth part of the questionnaire contains four active questions on demographic data of the subject's organisation and the position of e-commerce executives/managers in the organisation management structure. Two optional questions also added in this part.

- **Data Analysis**

In this research study, data analysis is divided into five steps:

1. Test of non-response bias and descriptive statistics on variables;
2. Test of reliability and validity of the instrument;
3. Identification of expected composite critical success factors;
4. Test of the relationships between CSF and Internet-based e-commerce implementation success;
5. Development of a predictive model for Internet-based e-commerce implementation success.

The questionnaire was tested for non-response bias. *Cronbach's coefficient alpha* was used to check internal consistency and as an overall reliability measure. Both construct and content validity were measured to ensure that the questionnaire met the validity requirements. *Canonical correlation analysis* was used to test the relationship between the identified CSF and Internet-based e-commerce implementation success.

1.7 SIGNIFICANCE OF THE RESEARCH

The purpose of this study is to develop and test a comprehensive model which describes the major critical factors of Internet-based e-commerce implementation success, thereby providing much needed guidance to corporate management to help them evaluate the effectiveness of e-commerce implementation.

Therefore, the results of this study may provide a contribution to both academic research and e-commerce management for CSF studies and Internet-based e-commerce system implementation. Identified strategic critical success factors could help focus future research on questions that significantly impact decisions regarding e-commerce implementation. It is also believed that the expected findings may help extend the existing knowledge on e-commerce implementation research.

The other expected contribution from this study is to identify and provide knowledge on key or critical success factors for companies who have already implemented or plan to implement, e-commerce in their business operations. This study also provides

a basic knowledge for further research on CSF and e-commerce implementation. E-commerce user companies may also benefit from the results and may be able to utilise the CSF for planning purposes.

E-commerce executives/managers could be expected to utilise the identified CSF for successful e-commerce implementation strategies. The expected CSF could also be used by e-commerce executives/managers, both as evaluation criteria for e-commerce system planning and control and as a facilitator of communication between e-commerce departments and their users. With better utilisation and better understanding concerning the implemented e-commerce system, the organisation might be better able to achieve cost savings, time saving, simplifying business processes, quality and efficiency in its new digital systems. Thus, the benefits of successful implementation could improve the corporate utilisation of information systems and Internet/e-commerce resources and assist in achieving a competitive advantage for the organisation.

Briefly the expected main contributions to exiting knowledge are:

- As far as the candidate knows this research thesis will be the first study of its kind. No published work was found in the field of critical success factors for successful implementation of Internet-based e-commerce in business operations at the time of this research.
- It is expected that research results will assist management in planning the implementation of Internet-based e-commerce in their business operations.
- It is also believed and hoped that this study will be very helpful for further research in the future.

On the other hand, besides its contributions, this research, like any other research, is subject to a number of limitations. One should keep in mind that this is the first and original study of its kind. However, the findings are clear and significantly supported by statistical analysis. Additional research is however needed for better understanding of this new digital business medium.

1.8 SCOPE OF THE THESIS

In this thesis, the remaining contents of the chapters are given in the following order:

Chapter 2 presents a background information about Internet-based e-commerce. The terminology, the usage, benefits and main issues of the e-commerce will be given in detail in this chapter.

In *Chapter 3*, a review of the literature relevant to the implementation research of this proposal is explained in details. Specific areas of literature review include various CSF studies and implementation studies in related areas; both academic/conceptual literature and empirical studies are reviewed.

Chapter 4 presents and justifies the research hypotheses in details.

Chapter 5 describes the research model and research methodology. A research design and methodology is presented, subjects for the study are identified and the validation of data collection instruments, as well as the procedures used to collect data, are discussed in detail.

Chapter 6 reports the results of the data analysis. First, the plan for descriptive statistics concerning the respondent e-commerce executives/managers and items for presentation, analysis and interpretation are given. Then, the statistical techniques used to obtain the quantitative results are discussed.

In *Chapter 7*, the research findings, the contributions and limitations of the research discussed in detail.

Chapter 8 as a final chapter of the thesis presents the conclusions, and recommendations for future studies.

CHAPTER 2

BACKGROUND ON INTERNET-BASED E-COMMERCE

Past: *"The world would not need more than 5 computers" Thomas J. Watson, The President of IBM, 1943.*

Present: 80 million computers connected each other via Internet so far (1999).

2.1 INTRODUCTION

The current dynamic and turbulent competitive business environment have put pressure on business operations all around the world to change traditional methods of conducting business to Internet-based e-commerce. A business revolution is looming towards the next millennium and that will be the e-commerce/e-business. This (r)evolution brings great opportunity and challenges to business operations both in manufacturing and service industries.

The development of Internet-based e-commerce offers the most exciting business opportunities in the marketplace. Organisations that want to stay in business beyond to the turn of the century must re-evaluate every aspect of their strategy and operations and incorporate these technological changes. Internet-based e-commerce is essential for the survival of companies entering a virtual distribution marketplace (Cronin, 1996; Mougayar, 1997; Kalakota and Whinston, 1997).

The business world is under competitive pressure because of the tremendous growth of the Internet and e- commerce implementation from manufacturing to retailing, from insurance to health, from banking to travelling, and from food to hospitality industries, especially over the last three years.

According to a report issued by online researcher eMarketer (July 1998), the number of non-U.S. Internet users, estimated to be around 23 million, is increasing at an average annual rate of 70 percent, contrasting a growth rate in the U.S. of only 43 percent each year. The study states that currently there are approximately 60 million active Internet users worldwide, with Americans accounting for 37 million users. It predicts that the number of non-U.S. Net users will increase nine-fold over the next five years, from 16.4 million in 1997 to 143 million by the year 2002. If U.S. figures are added for a total worldwide picture, the growth rate will more than quintuple, from 44 million in 1997 to 228 million by year 2002.

The *eOverview Report* (1998) predicts that true globalisation will begin to occur over the next few years due to the following factors:

- Emergence of telecom deregulation (with associated lower costs) in previously controlled markets
- Increased PC and modem penetration, particularly in Europe, Japan, Australia, New Zealand and the Netherlands
- The attraction of e-commerce to foreign businesses looking to draw revenues from a worldwide market
- Deployment of midband and broadband solutions
- The continued popularity of online services in Europe.

However, the report, issued by eMarketer, an authority on business online, projects by year-end 1998, the number of active users will increase to 47 million, and account for 23.5 percent of U.S. adults. The report only considers people who regularly get online--real users--at least once or twice a week, and at least for a period of one to two hours per week. The report predicts that the number of U.S. households and individuals will continue to rapidly increase through the year 2002 and by year-end 1998/early 1999, roughly five years after the Net began evolving into a viable commercial enterprise, the 50 millionth American will be online.

A Dun & Bradstreet survey reports that the number of top-1000 corporations doing business on the Web jumped 70 per cent (to 132) since April 1995, led by industrial and manufacturing companies, with banks and investment brokerages following suit (Business Week, October 1995). According to a survey conducted by Yankee Group (1996), over 70% of the Fortune 500 companies are already accessible via the Internet.

According to Bottoms (1995), the consumer model of e-commerce on the Internet has essentially obscured the real problems that business face. Now it's time for management to take a step back and focus on what e-commerce means from a business point of view. Bottoms predicts that many executives may soon find their companies in the midst of a major transition from the utilisation of EDI (Electronic Data Interchange) as a strategic tool in supply chain management to a much more comprehensive Internet-based e-commerce strategy.

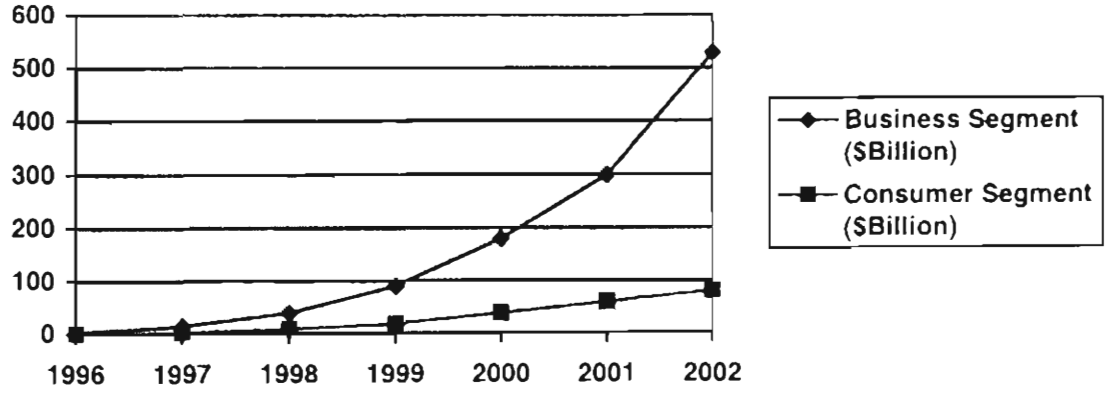

Figure 2.1: Worldwide Internet Commerce Revenues (Business and Consumer Segments 1996-2002. Source: IDC 1998).

The value of goods and services traded between companies over the Internet is expected to skyrocket from $8 billion in 1997 to $327 billion in 2002 in the US, according to a report from Forrester Research based upon extrapolation from July 1997 research with 150 companies across 12 major industrial categories including manufacturing. Businesses are adopting inter-company trade over the Internet because they want to cut costs, reduce order-processing time, and improve information flow. Forrester looked at

which industries are at the centre of the dramatic growth. Three different company types were identified: manufacturers, chiefly in electronics and airplane parts, represent 38% of all Internet business in 1997, a total of $3 billion; middlemen, computer-related and office supplies, total $2 billion in 1997; and services and utilities, total $3 billion. The worldwide Internet Commerce revenues are shown in Figure 2.1.

On the other hand the consumer segment of the e-commerce market will increase to $26 billion by 2002, more than 14 times last year's figure, according to a report released by eMarketer, an online business information site. The report states the business-to-business segment is projected to increase to $268 billion in the year 2002, from $5.6 billion in 1997 and $16 billion in 1998. That increase will be spurred by improved technology, security, user-friendly Web sites and increased worldwide penetration of PCs and modems. The report clearly indicates that the online world continues to be dominated by large corporations. These Fortune 500 companies possess the monetary and strategic resources to invest in non-revenue bearing net commerce systems, and have well-known brand names, global reach, and established supplier-vendor distribution networks. As in the offline world, the top 10% of e-businesses account for more than 90% of sales over the Web, the study found. And 97% of large corporations are connected to the net, compared to 21% of their small business counterparts. While 33% of large corporations are conducting sales over the Internet, only 4% of small business firms are doing so. The top four industry categories for e-commerce in the year 2000 will be financial/insurance services, travel, and entertainment/sports and groceries, the report predicts.

Meanwhile, Internet marketing research firm ActiveMedia (1997), citing its ongoing study of online marketers, said its latest projection indicates that global Web sales through 2002 could total $1.5 trillion, or about 3% of combined GDP for all countries worldwide. The study tracks eight Web business segments: manufacturing, computers and software, business/professional, consumer, travel, investment/finance, publishing, and real estate.

E-commerce has been an idealised trading concept for many years. But the lack of integrated applications and the unavailability of universally accepted methods of communication have been a constant plague. As the Internet develops there is every possibility that e-mail and applications-based technologies will take over from traditional telephony as the common method of communications.

Furthermore, the Internet provides an unprecedented infrastructure for moving information. This will have immense repercussions within the commercial world. The real key to making e-commerce over the Internet a normal, everyday business activity is the convergence of the telecommunications, content/media and software industries.

Information technology is developing so rapidly it is difficult to predict in which way businesses will use Internet-based e-commerce. However, expert predictions show that Internet-based e-commerce have already started to change the way of business companies do. The earlier the firms adopt e-commerce, the more likely they will survive and compete with their rivals.

Even though e-commerce over the Internet is very much in its infancy, it is rapidly becoming a new method to conduct business and to interact with customers, suppliers and partners. E-commerce covers many aspects of buying/selling relationships. It also covers many operations within production processes. Electronic trading opportunities offer businesses the chance to compete on an international scale and these are being expanded to Web sites. Manufacturers are scarcely implementing e-commerce over the Internet to gain strategic advantage over their rivals and not to be out of business in this very rapidly changing and competitive global business environments (Cronin, 1996).

Many reliable surveys show that over the next ten years, the growth of Internet-Based e-commerce will outstrip the growth of traditional commerce. It is the commercialisation of the Internet that is leading the way to this remarkable growth in E-purchases. The Internet serves as a foundation for all of these new opportunities in commerce.

There has been phenomenal growth in commercial presence on the Internet in recent times. In the last 3 years the commercial domain registrations on the entire Internet have grown to represent some 85% of all organisations. This effectively kills the myth that the Internet is an academic and research playground. The Internet has reduced the number of letters, voice calls and faxes around the globe. Thirty per cent of Internet users in one survey stated that Internet usage had resulted in new business opportunities and 43% said that it has increased productivity.

In addition the market research firm Paul Kagan and Associates released 10-year revenue projections for the interactive media industry, showing that in the year 2007, the Internet-related income is expected to be $46 billion, having risen from a projected $11.1 billion for 1997. E-commerce, revenue is expected to increase from $0.9 billion in 1997 to $11.7 billion over the next 10 years.

Books and computer hardware and software are the items most people purchase via the Web, according to data from the most recent study of Internet demographics by Nielsen Media Research and industry trade association CommerceNet (1998). The study shows that 5.6 million people have purchased books online, while 4.4 million people have purchased hardware, and 4 million people have purchased software. According to Nielsen Media Research and CommerceNet, 78 million people used the Web during the first six months of 1998, and 20 million of those users made purchases via the Web.

The Internet is becoming an important new medium of commercial way in business operations as well as other business activities. In other words it forces a change in the way we do business, especially over the last three years. Although it is infancy stage, the opportunities presented by the Internet seem to be readily apparent for business operations. By allowing direct links to anyone, anywhere, anytime the Internet lets companies build interactive relationships with customers and suppliers, and deliver new products and services at very low cost compared to the traditional one.

Companies all around the world have been living under the pressure of both strategic and organisational challenges springing from information technology (IT), especially over the last five years. In this rapidly changing world, the demand to produce, expand, develop, and advance has become overwhelming. International competition for goods and services has gone far beyond national boundaries. The change effects people, technology, organisational structures, information management and, of course, the way manufacturers operate.

Organisations that want to stay in business must re-evaluate every aspect of their strategy and operations and incorporate these technological changes. The Internet-based e-commerce has become essential for the survival of manufacturing companies entering the virtual distribution marketplace. The business-to-business and business-to-consumer segments of e-commerce contain both common and differing characteristics that must be understood to succeed in implementation.

The Internet is likely to transform dramatically the way business is conducted in many areas, including financial services, according to the Geneva-based World Trade Organisation (WTO). WTO estimates the value of goods and services traded via the Internet will grow to $300 billion by the year 2000 and 60 per cent of the banks in the OECD countries will offer Internet transactions by the year 1999 (Straits Times, Singapore; September 22, 1997).

Meanwhile, a number of dominant industries have jumped on the Internet bandwagon. Examples are: the IT industry, manufacturers, publishers, retailers, banks and financial institutions, airlines and others as shown in the following table (Table 2.1).

Table 2.1: Examples of Businesses Using the Internet-Based E-Commerce

Business	Application of Internet-Based E-Commerce
Manufacturing	Thousands of manufacturers use e-commerce from supplier relations to business partner and customer service.
Retail	Many retailers are now using e-commerce on the Internet with thousands of online products and services are offered.
Airlines	Hundreds of airlines have Web sites and doing business with e-commerce from order receiving to payment for the ticket.
Banks	There are more than 2500 banks on the Web from over 70 countries.
Media & Publishing	Many publishing houses have developed Web versions of traditional print media, and entirely new Electronic Magazines "e-zines".

Mougayar (1997) noted that perhaps the most significant outcome of e-commerce is the positive change it brings to buyer-seller relationships. The most successful users of e-commerce have recognised that increased familiarity with customers, dealers or suppliers afforded by joint systems leads to collaborative behaviours which improve economic performance for both partners.

E-commerce implementation by manufacturers is accelerating, driven by successes of early adopters. Literature indicates that entry is not expensive. Costs associated with e-commerce implementation, are level of system integration and communication, hardware and software and staff training costs. A typical e-commerce business transaction cycle in a supplier-retailer-customer (consumer) channel could include electronic transmission of purchase order, customer-buying schedule, advanced shipping notice, invoice and electronic funds transfer of payment (EFT) or e-cash.

The business-to-business and business-to-customer segments of e-commerce contain both common and differing characteristics that must be understood to succeed in a given implementation. The application of Internet-based e-commerce in manufacturing is currently receiving a worldwide attention because of its promise of reducing the manufacturing costs and just-in-time (JIT) applications (Cronin, 1996).

In the past year, the number of Internet users has more than doubled with most of this growth coming from newly registered commercial enterprises. Companies are beginning to use the Internet for shortening the development cycle of new products or services, communicating with suppliers and experts from around the world, receiving customer feedback, and accessing supercomputers for research and development. In addition, the Internet and its applications have made an information infrastructure for moving information between and within organisations. Undoubtedly, this will effect the profitability and competitiveness of Australian companies.

Conducting business on the Internet is an evolutionary process, which begins with building a Web site presence on the Internet followed by an e-commerce phase. Companies wishing to continue using the Internet to conduct their total business or a part of it, will eventually enter the full e-commerce/e-business stage.

The Internet and its applications have made an information infrastructure which now rivals the conventional telephone system in size, coverage and popularity. Despite exaggerated media suggestions that the Internet is effectively an enormous database of prospects to be targeted by marketing campaigns, Sieber (1996) and Telstra (1996) reported a view that manufacturers' use of the Internet is increasing. Early estimates, however, suggest that the percentage of Australian manufacturers who are actively using the Internet is still relatively small and primarily restricted to the more entrepreneurial organisations (Poon and Swatman 1995). It is widely accepted that companies are using the Internet because they believe they can gain competitive advantage. Poon and Swatman (1995) suggested that integration of Internet usage with business strategy is critical to its success.

As the commercial use of the Internet grows, it is becoming increasingly recognised that this is a very different business environment from its physical counterpart. According to Hoffman and Novak (1996), marketing approaches, which work well for broadcast or print media, may not perform as well on the Internet. Common ways of exploiting the

Internet as a business tool include marketing and information distribution; electronic mail for inter-company communication; and provision of services and products. Rayport and Sviokla (1995) also suggested that businesses can use the Internet to help them gain access to marketplaces (or "marketspaces"), which might otherwise be inaccessible.

During the last two decades, many manufacturing companies adopted the Electronic Data Interchange (EDI) technology to enter into the paperless economy. With the passage of time this has changed and now experts are debating whether businesses will abandon the well-structured, and planned EDI processes in favour of E-Business. Many businesses choose EDI as a fast, inexpensive (when compared to ordinary mail) and safe method of sending purchase orders, invoices, shipping notices and other frequently used business documents.

E-commerce establishes just-in-time (JIT) linkages with suppliers and customers for manufacturers with goals of shortened order cycles and improved inventory replenishment and management. E-commerce implementation is a reaction to customer and supplier requirements. Benefits for suppliers can include penetrating or defending product-segments, product and corporate differentiation, and development of strengthened business relationships resulting from direct links of company information systems.

E-commerce implementation in Australia varies significantly by industry. According to a recent survey, retailers and wholesalers were far more likely to implement e-commerce compared with manufacturers. In addition, consumer goods industries led industrial goods industries in e-commerce implementation. E-commerce implementation by companies is accelerating, driven by successes of early adopters.

2.2 FACTS AND FIGURES ON E-COMMERCE OVER THE INTERNET

E-commerce, which is frequently identified with the increased use of the Internet, is undergoing rapid development. The Internet has made a fundamental shift in how businesses are buying and selling products today. Using e-commerce to extend the supply chain will dramatically improve profit margins for both buyers and sellers and raise organisational effectiveness.

Internet-based technologies are changing so fast that it is very difficult to predict what business-to-business e-commerce will look like 5 years from now. Internet/intranet technology has changed the face of how companies operate today. Internet-based e-commerce levels the playing field for small to medium-sized businesses when dealing with large suppliers and trading partners using traditional EDI. Web-EDI is becoming the most promising application available today for moving e-commerce and business-to-business transactions to a new level of global commerce.

The collection of accurate and timely information is critical when implementing Internet-based e-commerce. The Internet has become critical for both information sharing and real-time communication as extended supply chains - suppliers, manufacturers, retailers and transportation providers collaborate and compete against other extended supply chains. The benefits of a fully-synchronised supply chain will increase sales and market share as well as reduce inventory and cycle time. With the Internet, financial institutions are actively shaping new product and marketing strategies which go far beyond previously limited EDI/e-commerce activities. Internet-based e-commerce will evolve from limited-reach proprietary trading communities to open-standard global trading communities.

Over the next five years, businesses will rush to embrace the combination of Internet, e-commerce and EDI technologies that will deliver tremendous cost, productivity and quality benefits. By using the Internet to add EDI trading partners, integrate the supply

chain and automate the sales process, businesses will be better able to redirect resources to retain and attract customers.

Internet technology will ultimately allow multi-national manufacturers to market their products directly to the consumer, resulting in sweeping changes in the structure of our economy. Companies are moving to network computing to manage their businesses through Internet technology and to take advantage of an ever-changing global economy. The strategic implications of network computing will be discussed, including: leveraging legacy information, improving customer service and maximising return of investment (ROI).

E-commerce and Internet ordering are an excellent means of communication that transcends the immense language barriers that exist in Asia and Europe and drastically reduces entry and shipping errors. Since 75-80% of Asian companies utilise automated systems, compared with only 40% in the US, will save thousands of dollars in phone calls and transaction costs.

Today, shippers, carriers and customers are utilising the Internet to exchange data and up-to-the minute information. But there are cautions to consider such as security and network infrastructures. However, by combining e-commerce with the advantages of the Internet, companies have the potential to save significant time and money in transportation services while raising customer service to new levels.

According to Plesman Communications Inc. (1997), e-commerce is revolutionising the way we conduct business. The technology is changing daily. According to the literature derived from electronic sources (that is, the Internet itself) not only is Internet technology changing very fast, but so is the number of users, profits, generated income, business and industry types.

There are also different research estimations between the global research companies (such as, IDC, Forrester Research, Deloitte Consulting, ActiveMedia, ACNielsen,

eMarketer, Cyber Dialogue, Jupiter Communications, McKinsey Consulting, GartnerGroup's Dataquest, Zona Research, etc.,). The followings are brief summary of the survey results on e-commerce:

According to Forrester Research reports in the U.S., Internet commerce is predicted to reach $349 billion by 2002 with the greatest gains occurring in business-to-business e-commerce. Some experts estimate this figure could even reach the trillion-dollar mark.

According to a report issued by online researcher eMarketer, the number of non-U.S. Internet users, estimated to be around 23 million, is increasing at an average annual rate of 70 percent, contrasting a growth rate in the U.S. of only 43 percent each year (July 14, 1998; source: Internet.com). The study states that currently there are approximately 60 million Internet users worldwide, with Americans accounting for 37 million users. If U.S. figures are added for a total worldwide picture, the growth rate will more than quintuple, from 44 million in 1997 to 228 million by year 2002.

According to a new Deloitte & Touche Consulting Group study (May 19, 1998), the e-commerce market is poised to experience 300% overall growth in the next two years. The Deloitte Consulting 1998 Global Survey of Chief Information Executives polled over 1,000 CIOs in six major industries in 25 countries. The two-year forecasts for percent of customer transactions in different industries are also encouraging:

- Consumer Business (43%),
- Public Sector (38.8%),
- Energy (37.2%),
- Manufacturing (34.1%),
- Health Care (33.3%).

2.2.1 Australian Internet Demographics

The number of Australians on the Internet soared by 14 per cent in the months from February to May 1998, according to the latest survey figures released by the Australian Bureau of Statistics (ABS) (source: australia.internet.com; August 31, 1998).

- **Personal Use:** This brings the number of households with Internet access to 970,000, which accounts for 34 per cent of households with a computer. The ABS did not produce exact figures on the total number of Australian Internet users although estimates from external sources place it at around four million, roughly one fifth of the population. It appears the confidence of these users is also growing. Arguments that people are reluctant to purchase over the Internet, have been justified to some extent with Electronic Funds Transfer at Point Of Sale (EFTPOS), with telephone the preferred way to pay bills. Less than one per cent of such transactions were paid over the Internet in the three months to May 1998.

  The latest ABS survey also found that 409,000 adults undertook 1.1 million transactions in the 12 months prior to May 1998. This number of users is double that recorded in the year to February 1998 ABS survey.

  On the other hand, according a new report, Australian Internet use doubling each year (http://www.internetnews.com/intl-news/1998/06/0801-briefs.html). A new report from the Australian Bureau of Statistics (www.abs.gov.au) shows that the number of Australian homes using the Internet is increasing by 100% each year. Titled "Use of the Internet by Householders," the report shows that the number of home Internet users has increased from 250,000 in February 1996 to around 1 million at the start of 1998.

  The report estimates that around 3 million people in total have accessed the Internet with 1.3 million of those being in the 25-29 year old age group. Only 207,000 people

have made an online purchase; and the Net is still a male dominated medium, with 1.7 million male users compared to 1.3 million women (I-Net.com magazine, Australia; May 27, 1998).

According to Roy Morgan Associates Research, there are 3.283 million Australians online (November 4, 1998). According to a survey conducted by CyberAtlas (1998), Australia is expected to generate $4.97 billion in e-commerce by 2002, with a predicted online population of 5.8 million.

- **Business Use:** More than 40 of the top 50 Australian companies maintain a Web site, some of them very large. Many of Australia's largest companies have already implemented a Web site during 1997.

A Yellow Pages Small Business Index Survey in mid-1996 reported that 9 percent of small businesses were using the Internet, and that this number would increase to 18 percent by mid-1997. The survey found that, the main small business sectors using the Internet were manufacturing and business services. The major use was to access information.

About 1,000 Australian companies in total have their own Web sites. Research estimates that, another 5,000-7,000 companies are represented on the Web as part of, for example, another site (business directory, industry sector site, shopping mall, etc.). Many companies use Internet e-mail, but do not yet have a Web site. Moreover, the Federal Government is a substantial provider, through Web sites and e-mail, of public information and services. In this manner, the Australian Government dedicated November 27 as "Online Australia" Day in an attempt to raise the awareness of Internet industries (INet.com magazine, Australia; June 24, 1998).

2.2.1.1 Examples of Successful Internet-Based E-Commerce Applications in Australia

There are many examples of Australian organisations – large, medium and small - successfully employing this new medium as a business tool, to realise their business goals. For instance, thousands of Australian businesses are gaining valuable benefits from the use of e-mail to communicate with travelling staff or far-distant customers and suppliers. Many are finding that a number of Australian organisations have successfully implemented an Intranet. A smaller numbers are using the very new technologies of Extranets and full e-commerce systems. Others are making effective use of the World Wide Web, and have implemented a corporate Web site.

A general view of the current business situations that are forcing any type of organisations to adopt Internet and its business applications are outlined with some organisations' effective use of the Internet/e-commerce and their success stories in Australia:

- **Australian Stock Exchange** (www.asx.com.au):

The ASX established its first commercial online service, the Enterprise Market (e.m), in March, which brings potential investors together with unlisted companies looking for equity capital. It also provides a forum for existing investors in unlisted companies to sell their shares. It is in the process of rolling out an Extranet to its subscribing information vendors and research analysts, which will replace existing electronic networks, fax and phone-base information distribution methods.

- **Lowes Menswear** (www.lowesaus.com.au)

Lowes established its Web site in order to promote and sell their merchandise online directly to the marketplace, which in turn will enjoy benefits such as discounted prices

(about 15 percent) and free delivery anywhere within Australia for orders more than AUD95. The site took four to six weeks to build with an investment of AUD15, 000. It gets between 17,000 and 20,000 hits per week. Just three people in-house and one externally work on the site. The site has brought a new market both nationally and globally and significantly lifted their profile of being one of Australia's largest menswear retailers due to the amount of publicity that they have received.

- **Advance Bank** (www.advance.com.au)

Web site provides information about the Bank's products and services. Additionally it offers Home banking for account holders (the first Australian bank to offer Internet Banking). As at end of September 1997, Australia had 52 banks. Of these, only 2 banks have started Internet banking services. These are Advance Bank and Commonwealth Bank. It is interesting to note that, surprisingly, Australia's biggest and most profitable bank, National Australia Bank, has not yet started Internet banking (as at October 1997).

- **Travel.com** (www.travel.com.au):

Travel.com claims to have transacted more than $1 million in Net-generated online ticket sales for the second consecutive month (1998). Roughly a quarter of that is business to business. In all cases inquiries initially came via the Web site or e-mail.

About a quarter of all Net users completed the online booking without staff assistance, to get a 5 per cent discount. The company has about 500 e-mail inquiries a day - about four times the number of people walking in from the street. The company has 15,000 e-mail subscribers to a weekly newsletter promoting discounted fares. A major benefit of the Web site is that customers do more research for themselves, resulting in in-house staff completing an average of 10 bookings a day, up from three.

- **Gateway** (www.gw2k.com.au):

Gateway individual customers with do-it-yourself PC configuration, ordering and credit card payment facilities via an Internet Web site. The company says sales have grown by 1,252 per cent in the last year. Sales are claimed to be roughly equal to the city storefront, so the Web site effectively saves on the cost of a storefront, sales staff commissions and a large percentage of support staff phone and processing time. Gateway also operates an Extranet to eight major accounts. Sales are higher via the Extranet than the Web site.

- **Toyota Australia** (www.toyota.com.au):

Web site provides information about Toyota and its range of cars and information about current Toyota promotional; and sponsorship activity. It also provides a link to its dealers' Web sites.

- **Harris Technology** (www.ht.com.au):

Harris Technology provides mostly business customers with direct access to its production database of more than 30,000 computer products, allowing customers to get their own quotes on items. Customers can access stock availability at Harris's suppliers to calculate anticipated delivery time. Once orders have been placed, customers can track them online. In its first year Harris transacted more than $1 million in online sales. This year it has been doing about $250,000 a month.

- **Boots Online** (www.bootsonline.com.au)

The Internet shop front for The Stitching Horse Bootery, a small Melbourne shoe and clothing store. The Bootsonline site displays a catalogue of boots, shoes and clothing for

sale. Orders can be placed (with model, size, and colour details) and paid for by credit card.

- **Commonwealth Securities** (www.comsec.com.au):

The stockbroking subsidiary of the Commonwealth Bank uses its Internet Web site to provide clients with online share tracking, ordering and payment facilities. Payment can be via the bank's online personal banking service, NetBank. Of its 165,000 clients, about 6,000 - or 4 per cent - are trading via the Net, but they transact about 11 per cent of total business. About 500 new Internet clients sign up each week. By June (1999) 25 per cent of business is expected to be via the Net. The site has gained profitability within its first year.

- **BHP** (www.bhp.com.au)

Australia' s largest company has a very extensive corporate Web site, providing a great deal of information to investors, shareholders and others interested in the company. This information includes: introduction to the company; products; corporate structures; media releases; financial results; and for each major operational division, monthly and quarterly detailed production and financial results.

- **Amway** (www.amway.com.au):

Amway makes information on the status of orders and points earned available to its 90,000 distributors via the Web. Credit card orders can be placed online 24-hours a day, seven days a week, cutting the cost of each order by up to $3 - a saving of up to $18,000 a month. Ten per cent of distributors are expected to sign up this year. Amway has also moved its printed catalogue online, allowing updates to the product line.

- **Sydney Morning Herald** (www.smh.com.au)

SMH' Web site provides electronic versions of the main articles and features of the day. In addition previous editions are available in a searchable archive. The SMH classifieds are online, in a searchable format.

- **DHL** (www.dhl.com.au):

DHL allows business customers to open an account online, book courier pick-ups, calculate the cost of parcels by weight and the projected time of delivery, print out forms such as customs declarations and track international and domestic shipments. DHL says its online "serve yourself" business equates to about 8 per cent of calls to customer service, saving more than $1 million a year.

- **FAI** (www.fai.com.au):

FAI provides online quotations on car, travel and home insurance. Offers 10 per cent off premiums if the purchase is made online without staff intervention other than e-mail. Says 95 per cent of Internet business is new business. Sells at least one policy online a day. The Web site is not yet in profit.

- **Western Star Trucking** (www.woodpeckertruck.com/wstruck.htm):

Set up an Intranet to provide its 40 dealers in Australia, New Zealand and Papua New Guinea with direct access to pricing and availability information. It is piloting Dealer Live!, providing access to the parts database. The ultimate plan is for online processing of warranties, claims submissions, finance and ordering of customised trucks. Projected savings of more than $250,000 a year.

- **Alcatel** (www.alcatel.com.au):

Alcatel allows customers to access information on orders from its internal database via the Web. Other trading partners such as its 300 suppliers and couriers will be added to allow end to end tracking of orders. The company expects to cut lead times by 20 per cent.

- **Commonwealth, State and Local Government** (www.gov.au)

Government at all levels is online, and the resources available are very extensive. This site provides the best entry point to the Web sites for all of Australia's Governments: Commonwealth, States, Territories, and Local. The site provides an up-to-date directory of links to all Government Internet sites.

All of the above implementations of information technology have enabled the organisations to compete effectively in this changing competitive business environments.

2.2.2 Real Numbers Behind The Global E-Commerce

The consumer segment of the e-commerce market will increase to $26 billion by 2002, more than 14 times last year's (1997) figure, according to a report released by eMarketer (http://www.emarketer.com), an online business information site. The report states the business-to-business segment is projected to increase to $268 billion in the year 2002, from $5.6 billion in 1997 and $16 billion in 1998. That increase will be spurred by improved technology, security, user-friendly Web sites and increased worldwide penetration of PCs and modems.

The study, entitled "The 1998 eCommerce Report," takes an in-depth look at both business and consumer segments, including dollar-size estimates, projected rates of

growth, e-commerce economics, fast-growing industries, as well as the companies that are paving the way. As in the offline world, the top 10% of e-businesses account for more than 90% of sales over the Web, the study said. And 97% of large corporations are connected to the net, compared to 21% of their small business counterparts. While 33% of large corporations are conducting sales over the Internet, only 4% of small business firms are doing so. The top four industry categories for e-commerce in the year 2000 will be financial/insurance services, travel, and entertainment/sports and groceries, the report predicts.

From eMarketer's (www.emarketer.com) "1998 eCommerce Report," which looks at the consumer and business segments of sales over the Web:

- Business-to-business e-commerce will increase to $268 billion in 2002, up from $5.6 billion in 1997 and $16 billion in 1998.
- Consumer e-commerce will reach $26 billion by 2002, up from $1.8 billion in 1997.
- The top 10 percent of e-commerce businesses account for more than 90 percent of sales over the Web.
- 33 percent of large corporations are conducting business over the Net, compared to only 4 percent of small businesses.
- 97 percent of large corporations are connected to the Internet, compared to 21 percent of small businesses.
- 75 percent of online revenues in 1997 came from advertising (banners and sponsorships).
- The top four e-commerce growth categories in 2000 will be financial/insurance services, travel, entertainment/sports, and groceries.
- By 2000, 56 percent of banks will offer online banking, compared to 35 percent today.
- The number of U.S. households purchasing groceries online will jump to close to 7 million in 2002, compared to 10,000 in 1997.

- Online airline ticket sales will account for 5 percent of total industry revenue in 2000, up from 1 percent today.
- Online book sales will account for 7 percent of online sales in 2002, up from 3.8 percent this year.

ActiveMedia's (http://www.activemedia.com) annual "Real Numbers Behind Net Profits" survey of Web-site revenue, indicates a correlation between time online and profitability:

- 58 percent of business executives whose sites have been operating for three or more years report that their site is profitable.
- For the past three years, overall, only about 30 percent of sites reported profits. This year, 46 percent claim Web-site profits.
- In 1997, the top 10 percent of revenue-producing sites averaged $4 million each.
- The average online business-to-business sale is almost $3,000.
- For 1 in 10 sites, it is above $10,000.
- 37 percent of manufacturing/industrial sites (with at least 1,700 employees) are profitable; 1 in 4 expects to be profitable in 1998, and 29 percent say that their site is not a tool for generating revenue.

Table 2.2 Profitability of Web Businesses by Time Online *(Source: ActiveMedia, 1998).*

	Total (%)	**1 year Online (%)**	**2 Years Online (%)**	**3+years Online (%)**
Profitable from current sales	46	41	43	58
Profitable in 1-2 years	29	32	31	23
Profitable in 3-5 years	6	6	6	5
Profitable in more than 5 years	1	1	1	1
Site does not generate revenue	19	20	19	14

On the other hand, small businesses are going online in a big way, according to a survey by Cyber Dialog/FindSVP. According to the survey, which polled a thousand

U.S. businesses with fewer than 100 employees, 37 percent of small companies--an estimated 2.6 million in the U.S.--"conduct business online." Of those, 84 percent sent e-mail to customers (65 percent used e-mail daily), 80 percent used the Web to find information (53 percent used it daily), and 38 percent purchased business products or services online. Half of the businesses surveyed said that they believed their online presence helped them offer better customer service, and a quarter of them attributed a sales increase to their being online.

The fact that only half believed the Net helped them to offer better customer service is more indicative of the other half's not taking advantage of the Internet. Whether that means re-designing their Web sites, coming up with a more useful online-business plan, or simply hiring a consultant, those businesses not happy with the results of the Internet are likely not devoting the resources to it. (http://www.findsvp.com)

- The research report from Simba Information Inc. in Stamford, shows that business-to-business commerce will total $19 billion in 1998, accounting for 67.3% of the electronic marketplace overall and making it by far the largest segment in the industry. The report is entitled "The Electronic Marketplace 2002: Strategies for Connecting Buyers and Sellers." The electronic marketplace is forecast to experience annual growth of more than 30% for the next five years, reaching $102 billion in 2002, the report says. Business-to-business commerce is expected to continue to drive much of the growth, accounting for 64.3% of total sales in 1999, 61.5% in 2000, 59.4% in 2001, and 56.8% in 2002. The second largest e-commerce segment is computer products and services, which is forecast to account for a 23.6% share of the market in 1998 and a 28.7% share of the market by 2002.

- Market research firm ActiveMedia's latest study shows the online business sectors poised for the fastest growth in 1998 (Source: Internet.com, 10 August, 1998) are:

1. computer hardware and software,

2. real estate,
3. publishing and information services,
4. finance and
5. Internet services.

- Online executives across all business sectors responding to an annual survey anticipate revenue growth of 63% in 1998--slightly higher than the 58% growth actually experienced in 1997. According to data in ActiveMedia's latest "Real Numbers Behind 'Net Profits" study of e-commerce, the top sectors expected growth rates of 150% or more over 1997. Same-site annual revenue growth of 100% to 149% was projected by managers in B-to-B services, telco and broadcast, travel and distribution / transportation / wholesale segments.

  Modest growth expectations of "only" 50% to 99% over 1997 revenues were anticipated in B-to-B products, consumer products, consumer services (other than travel, real estate and information), and Internet mall and transaction sites.

- According to ActiveMedia's report, e-commerce initiatives in the business-to-business sector rapidly expanding. Today B-to-B Web sites are viewed as communication vehicles that support off-line sales and relationships. Only 28% of B-to-B Web sites reported online sales activity while just over half of consumer-oriented Web sites sell directly. This trend will shift dramatically over the next 12 to 24 months now that businesses understand the cost savings of e-commerce and also better understand the scope of integrating online transactions with their current legacy systems.

- On the other hand, online grocery sales will climb to $33.6 billion by the year 2002, an increase of 3360% versus 1998, according to figures released by eMarketer in New York City (source: internet.com; August 3, 1998). eMarketer, an authority on business online, also projects that the number of online shopping households will grow to 6.9 million by year-end 2002, a 77-fold increase from the 90,000 households

recorded in 1998. eMarketer study shows that online groceries will achieve a penetration rate of between 15% - 20% of U.S. households by the year 2007 and account for 2% of the U.S. total grocery sales by the year 2000.

- A new study from Forrester Research projects that the online ticketing market will reach $10 billion by 2001, with more than $8 billion coming from consumer and corporate tickets for everything from air travel to concerts. The survey included responses from representatives of airlines, museums, railways, and theme parks. The report notes that these businesses are not waiting for the Web to become as popular as television. About 75% of the 50 companies surveyed said they were planning to sell tickets online, if they weren't doing it already. The survey respondents cited 24-hour operation, lower overhead, the removal of middlemen, and convenience for consumers as reasons to go online. However, some expressed concerns about possibly damaging relationships with non-online ticketing intermediaries, the additional investment required for existing ticketing systems, and that near-universal worry--transaction security.

- According to Forrester Research Reports in the U.S., Internet commerce is predicted to reach $500 billion by 2002 with the greatest gains occurring in business-to-business e-commerce. Some experts estimate this figure could even reach the trillion-dollar mark. Forrester cited two main reasons for the industry growth. With better encryption and security technology, online consumers are more comfortable than they have been with making travel plans via the Web, and travel suppliers are pushing their direct booking options to potential customers. According to Forrester, this year 76% of the top 75 airlines, hotels, and car rental agencies will offer online booking, an increase over the 37% offering the service in 1997. By the end of the year, travel and tourism is likely to be the Internet's leading business-to-consumer retail product, according to Forrester Research.

- According to Jupiter Communications, a New York Internet research company, more than $2.1 billion in airline tickets, hotel accommodations, and travel packages will be purchased via the Internet in 1999, up from $275 million in 1996.

- ActiveMedia Inc.' (http: www.activemedia.com) fifth update of the "*Real Numbers Behind 'Net Profits 1998*" study shows that companies will invest up to $23.6 billion by 2002 to upgrade their e-commerce automation. Retooling for an online world will ensure a steady stream of business for those who integrate the "front-stage" Web site experience with increasingly automated back-end business systems. Reflecting the tremendous gains in profitability and revenue growth, online executives have realistic expectations for both costs and benefits of automation--one in twelve (8%) will spend over $50,000, and another one in four (26%) from $10,000 to $50,000, on automated systems in the coming year. While the popular impression is that most Web sites are already automated, it turns out not to be so--fewer than one in ten (9%) of sites today are in position to process incoming orders and payments automatically. The rest all have manual intervention at some level.

- Online grocery sales will climb to $33.6 billion by the year 2002, an increase of 3360% versus 1998, according to figures released by eMarketer in New York City. eMarketer, an authority on business online, also projects that the number of online shopping households will grow to 6.9 million by year end 2002, a 77-fold increase from the 90,000 households recorded in 1998.

- The growth in the European Internet access market will be fuelled by business-to-business e-commerce and is expected to reach the $11.8 billion mark by 2001, according to a new study by Forrester Research Inc. Business access rather than consumer access spending is projected to be the major revenue source by 2001, the study said. The report predicts that big companies will encourage their business partners to follow them online, thereby accentuating the demand for additional connections and bandwidth.

Specifically, large to medium-sized firms are forecasted to produce 77% of business access spending in 2001. Although smaller businesses make up over 90% of regional enterprises, Forrester said they would most likely remain with dial-up accounts and not contribute a large portion to overall access growth. The study claims that the medium-to-large business sector will most likely be handled by global telcos such as WorldCom and Qwest - those that can offer competitive pricing, services, and the scalability necessary to support business-to-business e-commerce.

- On the other hand, Peapod Inc. announced it received its one-millionth grocery order on July 24, 1998. This is a testament to the power and popularity of e-commerce and to Peapod's success on the Internet, according to Peapod. Peapod, which said recently it is planning to enter the New York market, is beginning to shift its fulfilment operations to a warehouse-based distribution format. The company said it delivered approximately $114 million worth of grocery items since 1990, including 3.6 million bananas (the most popular item ordered).

- Germany should become the leader in e-commerce-based business in Europe in the new millennium according to new research from Jupiter Communications. By 2002, Jupiter said it expects the German e-commerce market to generate revenues of $782 million, $674 million, $216 million, and $174 million in online air travel, book, music, and software sales, respectively. Leading in all four categories, Germany is well ahead of France and the UK, the other big European commerce players, and offers the greatest potential for online sales growth, Jupiter said.

  Since the European online market for these categories is significantly smaller than the corresponding U.S. markets—which Jupiter said are expected to reach $37.5 billion by 2002--company analysts recommend that firms focus their online efforts on European markets that have the greatest growth potential, such as Germany.

- According to a recent survey conducted by market research firm IDC Asia/Pacific, 75 percent of the largest 1,000 companies in Asia, ranked by sales revenue, have established a presence on the World Wide Web. The figure represents a 57 percent rise since the last survey was conducted in October 1997. IDC said that, in comparison, 81 percent of U.S. companies with more than 100 employees have Web sites. (Web Vision, India; July 4, 1998)

- Online purchases are up dramatically over the past three years and now an estimated 43 million users are clicking to Web sites with their credit cards in hand, according to research firm NetSmart. In sync with predictions of growth in the e-commerce industry, research firm Greenfield Online reported that online purchasing increased by 34% from April to August 1998. Greenfield Online's August Digital Consumer Shopping Index, sampled 2,400 "Digital Consumers" in the last 90 days. Among the findings:

  - 41 percent participated in an online auction
  - 26 percent bought computer software
  - 25 percent banked online
  - 25 percent bought books
  - 23 percent bought airline tickets
  - 12 percent made hotel or travel arrangements
  - 12 percent say they have traded stocks, mutual funds, bonds or options online at least once in the past and 65 percent said they plan to do more trading in the future.

2.3 DEFINITIONS OF TERMINOLOGY

2.3.1 The Internet

The term Internet has been given several different meanings. According to many researchers, the most accepted definition is "*network of networks*". A broader definition of Internet is a "*method of time and cost cutting, by eliminating distance factors.*" Krol and Hoffman (1993) defined the Internet from three aspects:

1. A network of networks based on the TCP/IP (Transmission Control Protocol/Internet Protocol),
2. A community of people who use and develop those networks,
3. A collection of resources that can be reached from those networks.

There are many methods that individuals use to access the vast resources of the Internet through the TCP/IP protocol suite. These include Telnet, File Transfer Protocol (FTP), Gopher, Archieve, Veronica, Wide Area Information Servers (WAIS), Usenet, the World Wide Web (WWW), and E-Mail.

In 1969, the United States Department of Defence assigned ARPA (the Advanced Research Projects Agency) to experiment with the linkage between the Department of Defence and military research contractors. In the early 1970s, the experimentation in multiple network packet-switching technology at Stanford University resulted in the development of the TCP/IP protocol suite. The TCP/IP protocol had become the standard communications protocol by January 1983. In 1985, the NSF (National Science Foundation) established the NSFNET, and had become the dominant network. Commercial activity on the Internet has been increasing rapid ever since the early 1990s when NSF relaxed its "acceptable use policy" to permit limited commercial activity.

In March 1991, PSINet (Performance Systems) along with two other independent

providers, UUNet Technologies (AlterNet) and General Atomics (CERFnet), started the Commercial Internet Exchange (CIX). The CIX allowed access to the Internet without the NSFNet's restrictions for the first time. Commercial use of the Internet was finally possible (Reitz and Will 1995). The shutdown of NSFNET on April 31, 1995 was the last step of the commercialisation of the Internet. Of 6.64 million hosts as of July 1995, 1.74 million are .com domains, 1.41 million are .edu domains. Further, 2.37 million of these are international hosts connected to the Internet, representing 150 countries. As of October 6, 1995, in terms of number of domains, there were 135, 023 domains registered with InterNic, with the bulk of those representing commercial or the ".com" address (115,827) (Hoffmann et all. 1995).

The Internet blurs traditional organisational barriers and national boundaries, thus ushering in new and nimble competitors from unexpected quarters--from within the country and from abroad.

Internal Webs (in the form of Intranets) also help banks bridge their currently separate pools of IT deployment and leverage their internal data resources for competitive decision making. The global reach of the Internet opens up new customer bases, new delivery channels, and improved interactive services. Business activities like basic retailing, sales of equity, account inquiry and funds transfer are relatively easy to open up to the Net.

No matter which corner of the world anyone calls home, the Internet is undeniably a priority for anyone concerned with market opportunities in the information technology (IT) industry. While steadily growing in penetration and intensity in the U.S. business sector, the Internet and the World Wide Web are quickly becoming a global phenomenon. The number of Internet users around the world is constantly growing. *There will be 100 million Web users by the end of 1999. With Web population reaching nearly 175 million by 2001, the Internet is surpassing the PC as the engine of growth for the information technology marketplace* according to IDC (1998).

On the other hand, Industry Almanac (1998) has reported that by the year 2000, 327 million people around the world will have Internet access. The top 15 countries will account for nearly 82% of these worldwide Internet users (including business, educational, and home Internet users). Even though the forecasting is different from one company to another, it is a reality that the usage of Internet is doubling every year.

The cost of embracing the Internet is changes depending upon the level of implementation and operations of that technology. Figure 2.2 shows an approximate cost of embracing the Internet.

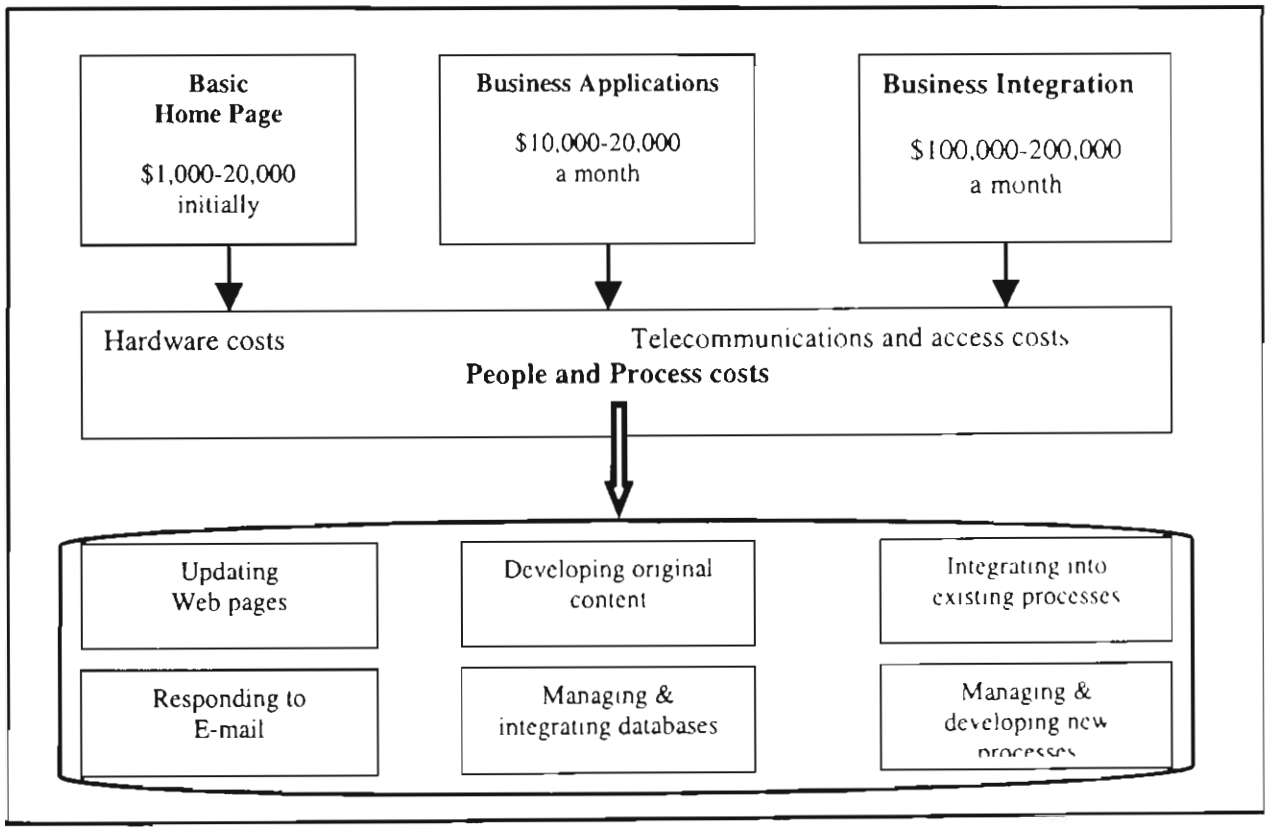

Figure 2.2: The Cost of Embracing the Internet (Source: www.consult, 1996)

Internet also offers global opportunity for every country. Conventional wisdom and a variety of other factors would lead many to believe that the adoption of Internet and Web-based technologies would proceed from developed, more risk-oriented countries to less developed, less technology aggressive regions. However, this has not proven to be

the case in all instances. The Internet and Web have allowed less developed countries to step onto the technology curve at an advanced stage and 'leapfrog' the infrastructure issues that developed countries have struggled with for years. This appears to be particularly prevalent in the Asia/Pacific region.

For example, Korea and India frequently appear at the top penetration and interest level throughout the study. They place in the top three positions in strategy, home page deployment, Java deployment and evaluation and extensions of the network to customers and suppliers. European pockets of opportunity include the Netherlands for home pages, self-hosting, and Java. France showed strong interest in Intranet, but much less in other categories. Germany and Italy frequently registered low in most indicators with the exception of ISP hosting and for Italy, only in extending the network to customers and suppliers.

Simultaneously, opportunity poses unique challenges for IT suppliers in regions around the world. At what pace are regions proceeding in their adoption of Internet technologies? Are different countries adopting the Web at a quicker rate? What factors are inhibiting growth? IDC's new report, Global Internet Opportunities: Pockets of Profit, addresses these questions through an analysis of Internet-specific data collected in the 1997 Global IT Survey. This data was extracted from an end-user survey consisting of 15,000 interviews across 15 countries worldwide.

Pockets of Profit examines market opportunities by region and country using ten leading indicators of Internet and Web connectivity, adoption, and commitment. The Internet has been used for various purposes: accessing the WWW (72%), sending e-mail (65%), downloading software (31%), participating in an interactive discussion (21%), participating in a non-interactive discussion (36%), using another computer (31%), utilising real-time audio or video (19%).

2.3.2 WWW (World Wide Web)

The World Wide Web (known as "WWW', "Web" or "W3") is the universe of network-accessible information, the embodiment of human knowledge. The World Wide Web began as a networked information project at CERN, where Tim Berners-Lee, now Director of the World Wide Web Consortium [W3C], developed a vision of the project (April 1993). The most exciting commercial developments are occurring on the World Wide Web (WWW). The WWW is a distributed hyper-media environment within the Internet, which was originally developed by the European Particle Physics Laboratory (CERN).

Grew in Web sites are very impressive along with the Internet. The Web grew a staggering 1758 in 1994 alone and doubles in size roughly every two to three months. More than 23,000 Web sites were found by the Web Wanderer in July 1995 (Gray 1995). Lottor (1996) estimated that there were at least 76,000 Web servers on the Internet, and this probably underestimated the total by as much as 20 percent. As of May 19, 1996, Digital's popular search engine AltaVista indexed over 225,000 Web sites (Hoffman, et al., 1997). On the other hand, according to Lynch (1997) there are roughly 24,000 businesses on the Internet in Australia (as of August 1997).

An important factor in the growth of the Web is e-commerce: the ability to buy, sell, and advertise goods and services to customers and consumers. The Web is a new communications medium and, like all new media, requires us to rethink the existing solutions to age-old problems. The World Wide Web Consortium is concerned with the evolution of the medium itself. The e-commerce Interest Group is a forum designed to allow the members to share information with the Consortium staff and other members about:

- Problems they have encountered (and proposed solutions)
- Priorities (in addressing the problems)

- Work underway in related areas
- What role, if any, the Consortium should play

The Interest Group has met three times a year for two years, with meetings spread across North America, Europe, and Asia/Pacific. There is an on-going e-mail list associated with the Interest Group. There is no required resource commitment beyond attendance at any or all of the meetings, although registration is required for each meeting.

The Web is primarily defined by three standards: URLs (Uniform Resource Locators, HTTP (Hypertext Transfer Protocol), and HTML (Hypertext Markup Language) (Richard 1995). These standards are used by WWW servers and clients to provide a simple mechanism for locating, accessing, and displaying information available through other common network protocols (such as Telnet, Gopher, FTP).

- **Uniform Resource Locators:** URLs provide a simple addressing scheme that unifies a wide variety of disparate protocols. A URL consists of three parts in the forms of protocol/host:port/path. The protocols include FTP, Gopher, newsgroups, e-mail, and HTTP.

- **Hypertext Transfer Protocol:** HTTP is an application level protocol based on a request-response paradigm. It is a relatively simple, highly flexible protocol used to deliver information across the Internet.

- **Hypertext Markup Language:** HTML a language derived from Standard Generalised Markup Language (SGML), and defines the structural and representational elements of a Web document using various tags. The tags determine how the text should be rendered for the user. Additionally, HTML provides the capability to represent the relationships between documents.

The WWW has been used extensively for business purposes: collaborating with others

(54%), publishing information (33%), gathering information (77%), researching competitors (46%), selling products or services (13%), purchasing products or services (23%), providing customer service and support (38%), communicating internally (44%), providing vendor support and communications (50%).

2.3.3 Intranet

An Intranet is a private TCP/IP network within an organisation linking all the internal divisions and distributed sites, irrespective of location and hardware specification. An Intranet enables a closed user group to exchange information within an organisation, using the Internet's world-wide standards. Intranets are an alternative to traditional company networks with proprietary standards.

From the technical perspective, an Intranet is a heterogeneous computing environment connecting different hardware platforms, operating system environments, and user interfaces in order to seamlessly communicate, collaborate, transact, and innovate.

From the organisational perspective, an Intranet is a learning organisation, capable of integrating people, processes, procedures, and principles to form an intellectual culture dedicated to implementing total organisational effectiveness.

According to Chester and Kaura (1998), the primary motivation to implement Intranets is to improve the flow and timely access to information within an organisation, as well as collaborative working on corporate projects. Use of Internet technologies offer cost savings over competing alternatives, as well as reducing the training time for implementation. One-to-many publishing applications can significantly reduce the cost of producing, printing, shipping and updating corporate information. Two-way transaction driven applications can improve information quality and provide a highly efficient alternative to paper-based business processes.

On the other hand, many-to-many interaction facilitates the exchange of information between interested individuals, perhaps forming part of a newsgroup or workgroup. Many companies have built internal networks using the same software as the Internet. Companies use Intranets to distribute information and speed data among offices. Intranet activities usually take place behind secure "firewalls" so that only authorised users have access. An Intranet can span multiple business locations via the Internet.

Norton and Smith (1998) outlines four purposes of implementing an Intranet system:

- To update the Web site,
- To exploit organisational information and knowledge,
- To make partnership, customer or supplier relationships more effective,
- To facilitate new ways of working.

According to Swank and Kittel (1996), organisations are beginning to reap the benefits of this new technology and its applications. Intranets have enabled organisations to:

- Centralise information
- Organise information
- Decrease costs and increase efficiency
- Improve the sharing of information
- Speed up development and distribution of applications
- Promote establishing WWW sites.

Moreover, the variety of Intranets is as varied as the organisations themselves. Some organisations see Intranet applications merely as a means to facilitate better communications and sharing of information, whereas others see it as an enabling technology that will result in entirely new ways of conducting internal business. Some of the typical uses of Intranets are:

- Human resources functions
- Information dissemination and sharing
- Product and service information
- Employee training
- Project information
- Research and development.

According to Norton and Smith (1998), the advantages of Intranets are:

- Elimination of duplication of information and of confusion over which is the latest version of a document.
- Wider ownership of information is encouraged and there is greater pressure to make it accurate.
- Better customer service because the organisation is less 'departmentalised' and more integrated.
- More efficient transfer at lower cost.
- Improved team-working and collaboration on projects because the Intranet provides a common working and reporting base.
- Increased potential for innovation and development because a source of contacts.
- Improved product/service design because the Extranet keeps you in touch with customer views.
- Faster response times from employees, suppliers and customers, which can lead to increased speed to market.

A study by Killen & Associates Inc., forecasts that the market for Intranet software and services will grow from $2.7 billion in 1995 to more than $20 billion by the year 2000. On the other hand, results of a study of Netscape Intranets conducted by International Data Corporation (IDC) shows some companies are recovering Intranet investment costs within 6 to 12 weeks. The study also found that some companies with Intranets are achieving a return on investment of 1,000% (Hasek, 1996). Table 2.3 shows some

examples of the usage of the Intranet.

Table 2.3: Examples of Intranet Applications (After Robinson, 1996).

ORGANISATION	INTRANET APPLICATION
Rockwell International	Check status, tolerance, and output of computer-controlled machine tools.
Babson College	Provide electronic grading and online course registration
Home Box Office	Distribute sales data and promotional video clips to eight remote locations
First Union Bank, Charlotte, North Carolina	Provide online telephone directory linked to organisation charts and information about employee job experience.
Mayo Clinic	Provide clinical, research, and medical training materials.

One of the most successful integrations of Internet access into internal Web-based systems is the US Federal Express delivery service. Customers can use online access to follow the movement of their freight packages from supplier to destination. More than 10,000 customers a day sort through the Web pages tracking their parcels. It is reported to be saving the company $US2 million a year. The company is now giving its 30,000 employees worldwide browsers to look at the Intranets it has set up. Another large US Intranet operator, Boeing, has more than 300 Intranet servers accessed by 20,000 staff (BRW, June17, 1996).

2.3.4 Extranet

The Extranet is a private version of a company's Internet presence (Bernard, 1998). An Internet-based virtual network joining the Intranets of different enterprises together, making a collaborative inter-enterprise electronic community. In another term, an Extranet is the use of Internet standards across enterprise boundaries for direct connection between organisations or via their Internet/Intranet infrastructure. This may include components that are public (such as a company's regular WWW site), components that are private (such as a service protected by password and ID), or components that are semi-private (such as a 'shadow' WWW service that is only publicised to dealers or business partners). This enables organisations to exchange

business information and transactions across their enterprise boundaries using Internet technologies, commonly referred to as Internet commerce.

With the Extranets, businesses can integrate their processes with its suppliers, customers, dealers, trading partners, and distributors and outside sales representatives. While traditional EDI promotes machine-to-machine communication for financial or inventory purpose, Extranets enhance human-to-human communication, using a Web browser, as opposed to EDI's more difficult character-based screens. A report from International Data Corporation (IDC) found that Extranets cost 20 to 40 percent less to operate than traditional EDI and require 80 percent less in training costs. In addition, installation of an Extranet system is simple for companies with an existing Internet or Intranet in place. There are two uses of Extranets:

- The method for business-to-business transactions between trading partners from an Intranet through a secure gateway to the Internet.
- A secure externally hosted service or value added network (VAN), using Internet standards and protocols. These are beginning to carry electronic trading transactions in place of traditional proprietary VANs.

Whilst an Intranet serves the internal organisation, an Extranet extends the capability to major trading partners, it is quite likely that at some point open access to the Internet will be required. At this stage, software "firewalls" become critical in preventing access by millions of Internet users to precious proprietary corporate information (Chester and Kaura, 1998).

2.3.5 Electronic Data Interchange (EDI)

Electronic Data Interchange (EDI), most simply, is the exchange of structured data between computer applications. EDI enables companies to exchange business documents - invoices, purchase orders, payments, or even engineering drawings -

electronically via a direct communication link, with no human intervention and is a precise format (Attaran, 1995).

EDI over the Internet is already a practical option, at much lower transaction costs than VANs are able to offer. Internet EDI messages are encrypted for security, transmitted to a trading partner across the net and acknowledged at the time of decryption. It is faster and cheaper than VANs offerings; it is close to real time, not batch store and forward, and is secure and acknowledged upon receipt. Web-based EDI is much simpler than fully integrated, file transfer EDI. It achieves the same objective but is a form-based process, sending one transaction at a time. Therefore it will only be used for fairly small volumes. The Web page performs the standards translation, behind the electronic form, transparently to the user.

According to Chester and Kaura (1998), Internet Commerce together with EDI will enable companies to:

- Shorten procurement cycles through use of online catalogues, ordering and payment;
- Cut costs on both stock and manufactured parts through competitive bidding;
- Reduce development cycles and accelerate time-to-market through collaborative engineering and product implementation;
- Gain access to worldwide markets at a fraction of traditional costs;
- Ensure product, marketing information and prices are readily accessible.

2.3.6 Internet-Based E-Commerce

E-commerce, *e-trading* and *e-business* are often used interchangeably and there is often a perception that these terms principally refer to the procurement cycle - the ordering and paying for goods or services either via e-commerce technologies such as EDI or, more recently and growing in popularity, online Internet shopping. E-commerce

includes Internet, WWW, and IT/IS hardware and software. In this study, the term e-commerce includes all types of Internet-based commercial business applications.

Internet-based e-commerce, is a modern business methodology that addresses the needs of organisations, merchants, and consumers to cut costs and time to market of a product or service, while improving the quality of goods and services and increasing the speed of service delivery (Kalakota and Whinston, 1996).

There are no exact definitions of Internet-based e-commerce. Since, Internet commerce is still immature, so is the definition. However, one definition made by Kalakota (1996), as *"the process of converting digital inputs into value-added outputs"*. Therefore e-commerce can be simply defined as "*doing business electronically across the extended enterprise.*"

Internet-based e-commerce is not an extension of EDI (Electronic Data Interchange) which has been primarily limited to computer-to-computer transactions, and has not been associated with major transformations of firms. Internet-based e-commerce is giving a new way to Electronic Business Operations (EBOs), with different characteristics than traditional EDI and is an evolution from EDI (Soliman and Gide, 1997b).

Another interesting definition of e-commerce stated by Gartner Group (1997) as " *a dynamic set of technologies, integrated applications and multi-enterprise business processes that link enterprise together. These links among enterprises are implemented by specific business functions, and the primary business functions that must implement e-commerce capabilities are those that have the most contact with trading partners, including procurement, order entry, transaction processing, payment, production, inventory, fulfillment and customer support.*"

At a more detailed level, e-commerce covers any form of business or administrative transaction or information exchange that is executed using any information and communications technology (ICT).
E-commerce embraces:

- business-to-business (ie., Extranet);
- business-to-consumer (ie., Internet);
- business-to-employee (ie., Intranet); and
- government-to-nation (both businesses and the citizen; ie., Internet).

Basically, electronic business process involves taking information as raw material and producing added-value information-based products or services out of the original raw information. So, e-commerce refers to an online production process owned by intermediaries. Producers of information interact with services and other processed information, such as orders, payments or instructions.

In reality, Internet commerce is about businesses and consumers adopting a new process or methodology in dealing with each other. These processes are in essence supported by electronic interactions that replace close physical presence requirements or other traditional means.

On the other hand, if we regard traditional e-commerce as what EDI promised, the current evolution of e-commerce referred to as Internet commerce is what the Internet is promising, beyond EDI. Internet-based e-commerce is giving a new way to e-commerce, with different characteristics than EDI. Internet commerce is not a repeat of EDI, but rather is an evolution from the EDI. Table 2.4 summarises fundamental differences between traditional EDI and Internet-based e-commerce.

Table 2.4: EDI vs Internet-Based E-Commerce (After Mougayar, 1997)

Factors	Traditional EDI	Internet-Based E-Commerce
Implementation dynamics	Value proposition is biased toward a predetermined relationship, otherwise the transaction can't happen	The consumer of services decides and initiates the request to buy in a one-to-many relationship.
Business case	You develop the transaction capabilities only after you know there is a market or willingness to use the channel	You develop content and make it ready for a critical mass of buyers to get connected.
Financial transactions	Financial transactions can take place over existing networks.	Internet gateways to financial networks, new instruments and micro-payments become as important.
Effect on business processes	Any transaction done has a direct effect on internal business processes.	Transactions should mirror reality or they should dramatically simplify a business process.
Frequency of transactions	Smaller frequency, but higher dollar value per transaction.	Mass market, infrequent usage and lower dollar value per transaction are acceptable.
Choice of products	Comparison shopping is excluded.	Comparison shopping is essential.
Level of trust	High.	Low to medium.
Duration of relationship	Long.	Short to medium.
Cost	Higher.	Lower.
Reliability	Higher.	Lower(but getting better).
Flexibility	Lower.	Higher.
Effect on distribution channels	No conflict of distribution channel due to primary focus on uniqueness of transactions.	Channel conflict on line, as the transaction becomes the "back end", and the consumer interface becomes the "front end".

EDI has been primarily limited to computer-to-computer transactions, and has not been associated with major transformations of firms. Firms have to break new ground in Internet territory, in order to capture emerging digital markets or global Internet markets (iMarket).

A pattern is emerging to illustrate how organisations start their involvement with the Internet and progressively extend this activity to conduct Internet-based e-commerce over it is shown in Figure 2.3 below:

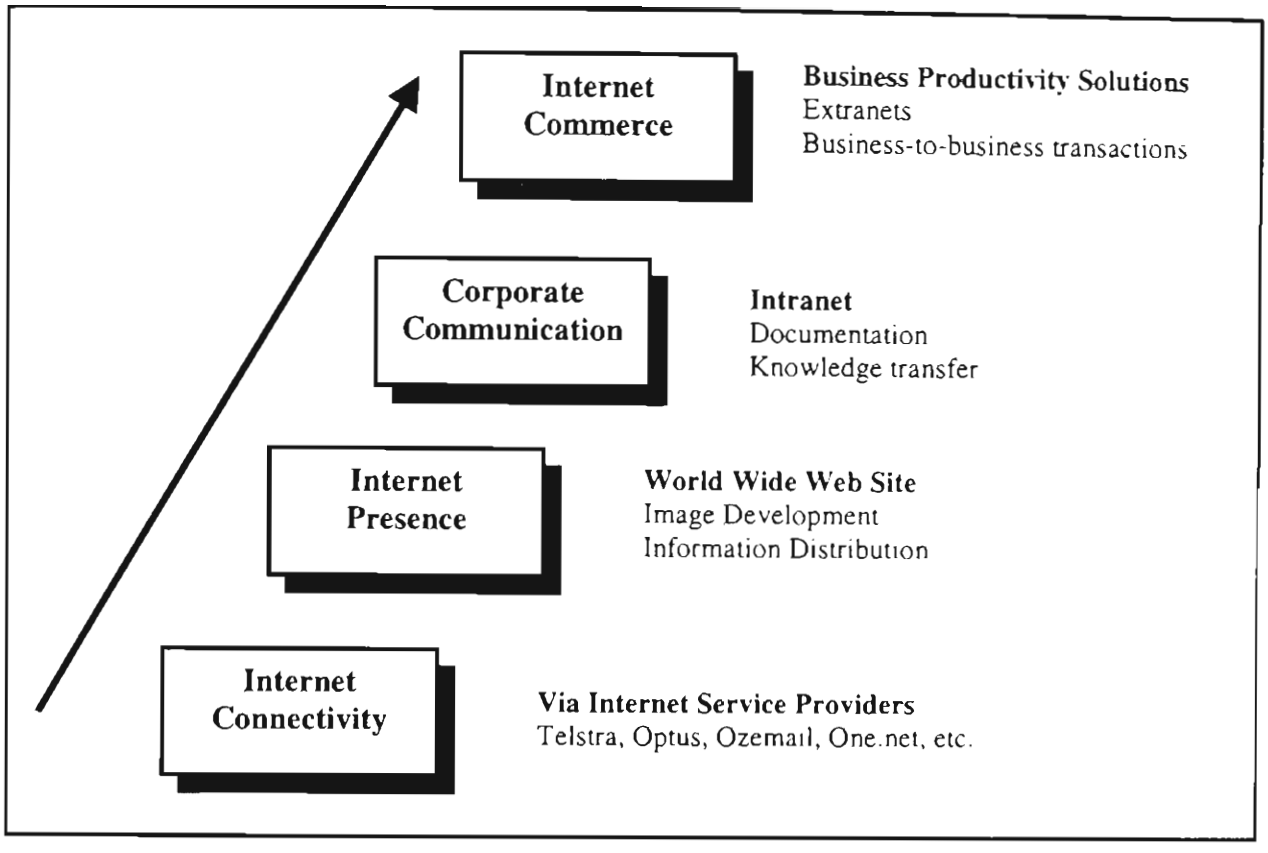

Figure 2.3: Internet Commerce Evolution (after, Chester and Kaura, 1998).

The Internet can be used to interconnect companies, by-passing any of the standard structures of EDI and VANs. A more significant role for the Internet has been explained by Socka (1996). In Socka's views, the regular EDI structured transactions are treated as a special type of e-mail attachment by the Multipurpose Internet Message Extension (MIME) standard. At the receiving end, the messages are simply printed out without any further translation. Furthermore, the Internet browsers, with their Hypertext Mark-up Language (HTML), are easy to adapt to many types of information exchange when compared to EDI standards which are very structured and rigid. In addition, the Internet is very easy to use, while EDI requires trained personnel to operate it.

According to Iacovou et al. (1995), the benefits obtained from e-commerce use include both direct and indirect benefits. Direct benefits, such as reduced transaction costs or lower inventory levels, are relatively easy to quantify. For example, networking giant,

Cisco Systems books $11 million in orders per day from resellers, or around $4 billion per year on its Web site. The company saved $363 million in tech support, distribution, and marketing costs in 1997 (Business Week, June 22, 1998). On the other hand, indirect benefits such as better customer services and improved trading partner relationships, are difficult to quantify. According to Tengende (1993), and Quach (1995), direct benefits take a longer time to eventuate. Furthermore, Swatman (1993) pointed out that to achieve longer-term benefits from telecommunications-based information systems, an organisation needs to combine its inter-organisational systems strategy with existing business strategy.

The Internet offers some impressive possibilities including the Internet transmissions rates, which are cheaper than EDI. According to Bell (1998: 16) the traditional EDI can reduce the cost of ordering to about $2.50 per order. However, the Internet could reduce that cost even further to less than $2 per order. In addition, through the Internet, messages can be sent faster compared to EDI, because they are sent directly from one computer to another computer via web routers. Most EDI users today send EDI transmission in overnight batches to save time. EDI usually takes eight to ten hours and often twenty-four hours, while messages through Internet arrive in minutes not hours or days. Pyron, (1996: 84) stated that: " The speed is actually higher than over a VAN because there is no mailboxing and we will often have people tell us they have received an order we have just sent while we are on the phone with them".

According to Garrison (1998), manufacturers are showing more interest in Internet technology over Electronic Data Interchange. Furthermore, Garrison (1998) stated: "Despite EDI's active part in manufacturing, suppliers and customers linkage, price quotes and shipping notifications, among other data, product data change, the medium's adoption has been limited". This means, manufacturers are more interested in Internet, because it potentially offers a more feasible means for manufacturers and trading partners to communicate electronically. Garrison (1998) further reported that three-

quarters of the respondents to a recent survey said that Internet is a useful communications tool and that only a few manufacturers use EDI often.

Companies embarking on using the Internet initially develop corporate Web sites to use as a promotional vehicle, to promote their company's icon and/or to attain new sales prospects. On the other hand, those manufacturers who are sticking with EDI, found that distributors saw Value Added Network charges as discouraging, and would often fail to check warehouse inventories because of the added communication costs. According to Gallo (1997), "These cost-avoidance habits would lead to inefficiencies, such as ordering from warehouses that no longer stocked a product". The Internet-based technology provides a cheaper solution to this problem.

The Internet offers the greatest potential for e-commerce known to date. According to Steel (1996) "there are less than 100,000 EDI (Electronic Data Interchange) users world-wide after 40 years or so of endeavour".

The impact of global markets, world-wide communications and the removal of trade barriers is evident throughout both public and private sectors, forcing organisations to adopt new ways of doing business in order to continue to operate successfully in the changing environment.

Instantaneous communications and the sharing of data across corporate and geographic boundaries allow business to be conducted in the most appropriate way, rather than one limited by historical practice. The possibility of creating *'virtual organisations'* has become a reality. Established working practices are being re-appraised - and often replaced - to support the new ways of handling business electronically, known as e-commerce.

Kalakota (1997) notes that that strategic use of information technology is crucial, but also that the impact of technology is only the beginning of an imminent revolution.

Organisations considering the implementation of Internet-based e-commerce into their IT/IS may be able to realise this potential cost-effectiveness. Many organisations appear to consider the possibility of implementation of Internet to their systems to achieve dramatic savings in cost along with other potential benefits such as improved responsiveness, more control, increased flexibility and better integrated IT/IS (Cronin, 1996). According to Maugoyar (1997), and Cronin (1996) organisations that do not take advantage of the growing opportunities provided by Internet-based e-commerce are likely to slip behind in the competitive business world.

2.4 INTERNET-BASED E-COMMERCE IN BUSINESS OPERATIONS

The adoption of doing business on the Internet is the consequence of business globalisation strategy. Doing business on the Internet has many advantages for both big and small organisations (Cronin, 1994). The characteristics of the Internet itself conform to the main objectives of business operations mainly:

- Doing things fast and on-time or real time,
- Doing things right,
- Doing things cheap.

A significant advantage of the Internet is that it allows small organisations to compete effectively with large organisations because the cost of entry to the technology is low. The Internet is a relatively inexpensive business resource that permits small organisations to compete with large organisations.

On the other hand, Internet business is such a new phenomenon and so much about it is uncertain and confusing that it is difficult for managers at most companies, to decide the best way to use it. It is also difficult for them to estimate accurately the returns on any Internet investment they make. That is why it is very important to determine what opportunities and threats the Internet poses. Managers should focus in a systematic way

on what the Internet can allow their particular organisation to do. In general terms, the Internet commerce presents four types of opportunities for companies:

1. Companies can establish a direct link to suppliers, distributors, and customers to complete transactions or commerce information more rapidly and conveniently.
2. Companies can reduce or eliminate some of its value supply chain.
3. Companies can develop and deliver new products and services for new or old customers.
4. Companies can exchange business or product designs and projects, and exchange the information just-in-time with the elimination of time and place dimensions.

2.4.1 Driving Forces to Internet-Based E-Commerce Implementation

Companies start e-commerce for many different reasons. However, based on the literature survey, there are some typical driving forces for companies to embark on e-commerce implementation. According to ABC News the e-commerce implementation across the Australian businesses doubling every six months due to increase of sales motivation (ABC News, 18/2/1998).

Various surveys around the world and in Australia show that sale-focused motivational elements are the major driving forces to e-commerce implementation. Some of these elements are:

- Reduce cost of operations
- Increase sales and profit
- Pressure from major customers' and suppliers' request
- Satisfy the needs of customers
- Control better on suppliers and customers
- Ability to capture more market share
- Pressure from competitors (rivals)

- Reach potential customers
- Improve company's image
- Paperless work
- Reduce rework
- Increase productivity
- Improve product quality
- Pressures from globalisation
- Achieve competitive advantage

On the other hand, the six main reasons to implement e-commerce are:

1. Order cycle improvement.
2. Error reduction.
3. Cost reduction as part of an overall corporate strategy.
4. Higher order inventory management processes.
5. Satisfying customer needs.
6. Cash-flow considerations.

It is clear that the pro-active drives in e-commerce implementation are related somehow to the Just-in-Time (JIT) philosophy. Thus, e-commerce can be treated as an effective tool, which contributes, to the JIT process.

Worldwide growth in the use of home PCs, and growing connectivity to the Internet, has prompted the emergence of new opportunities in global commerce. Internet shopping is experiencing a tremendous expansion - the ability to purchase goods and services electronically, around the clock. Anyone can purchase goods any time of day or night, from a variety of merchants around the world. Toys from Jakarta, artwork from Cairo, handmade silk carpet from Kayseri, without leaving their home.

2.4.2 E- Commerce Over the Internet

Hoffman et al. (1995) proposed a structural framework for examining the explosion in commercial activity on the WWW and explored the role of the WWW as a distribution channel and a medium for marketing communications. WWW results in "10 times as many units (sold) with 1/10 the advertising budget". It is about one-fourth less costly to perform direct marketing through the Net than through conventional channels.

Hoffman et al. (1995) categorised commercial WWW sites into six distinct types including: Online Storefront; Internet Presence; Content; Mail; Incentive Site; and Search Agent.

Steinfield et al. (1995) investigated the impact of e-commerce on buyer-seller relationships. Nouwens and Bouwman (1995) examined the use of information and communication technology to establish network organisations. Picot et al. (1995) analysed the automation of capital markets using the Internet. Crede (1995) examined the requirement and opportunities for new payment systems using the Internet.

The following table (Table 2.5) shows the stages of e-commerce implementation in a firm.

Table 2.5: The Four Stages of E-Commerce Implementation (After Varney & McCarthy, 1996)

STAGE	ACTIVITY
I	Publishing model with no real impact on business processes. In this stage companies digitise internal data.
II	Similar to the early introduction of EDI at sites. At this point, companies start thinking about re-engineering a part of their business process. Integration with back-end systems begins. "Flow through" is the goal-a full hands-of approach to certain specific processes.
III	At this point, companies move into original content, which may be highly interactive. One-to-one marketing is the goal: a company seeks to develop profiles of the users accessing its sites so that they can be treated uniquely.
IV	This fully enabled e-commerce model seeks to achieve dynamic segmentation, in addition to developing basic user profiles. Specifically, segmentation of site visitors is done in real time based on user activity.

(Source: M. Taylor, and A.D. Little.)

Electronic trading opportunities offer businesses the chance to compete on an international scale. These electronic trading opportunities are being expanded to Web sites. The Internet has reduced the number of letters, voice calls and faxes around the globe. 30% of Internet users in one survey stated that Internet usage had resulted in new business opportunities and 43% said that it has increased productivity. The following figure (Figure 2.4) is an illustration of the e-commerce framework model.

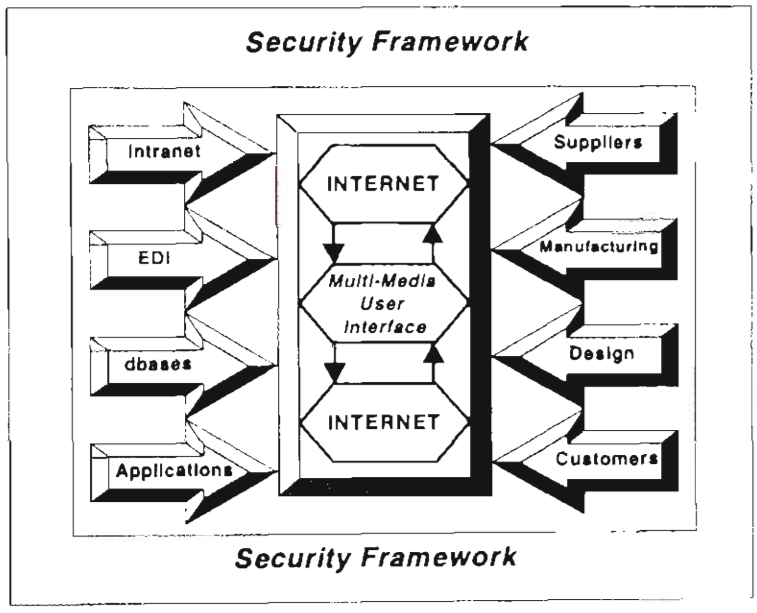

Figure 2.4: A Model of Internet-Based E-Commerce in Manufacturing (After Gide and Soliman, 1997).

There has been phenomenal growth in commercial presence on the Internet in recent times. In the last 2 years the commercial domain registrations on the entire Internet have grown to represent some 85% of all organisations. Facts and figures from industry show that:

- Internet-Based e-commerce is expected to reach $150 billion by the year 2000 and more than $1 trillion by the year 2010;

- Sales generated via the Web have grown from $17.6 million in 1994 to nearly $400 million in 1995 (a growth rate of over 2100%);

- The number of sites using the Internet for product transactions has increased from 14% in 1995 to 34% in 1996 and to a projected increase of 44% in the next 3 years.

The e-commerce business process involves taking information as raw material and producing value added information-based products or services out of the original raw information as shown in the following figure (Figure 2.5). The figure shows that the two models (*Physical and Conceptual Models)* in a manufacturing setting are similar.

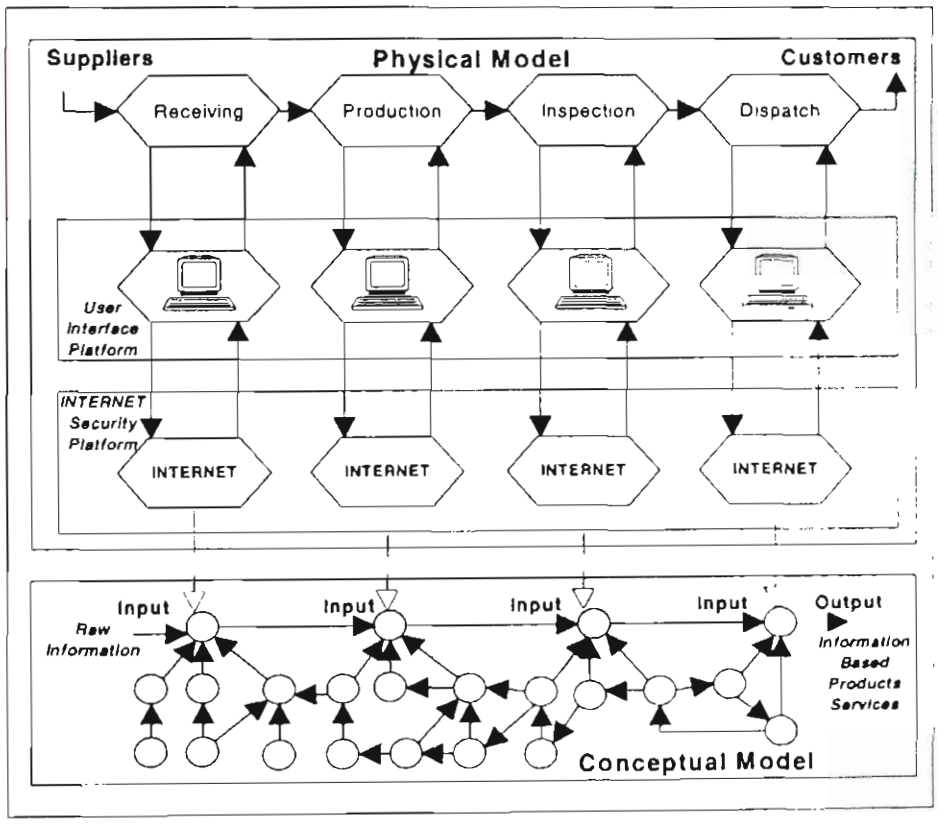

Figure 2.5: The Process of Adding Value to Information in a Manufacturing Setting Using the Internet-Based E-Commerce (After Gide and Soliman, 1997).

In the Physical Model raw material enters the system and leaves as finished goods. In manufacturing the raw material and converting into finished products, the Internet-based e-commerce is used through two platforms (*User and Security Platforms*). In the Conceptual Model raw information is entered in the system and leaves as processed information. So, e-commerce refers to an online production process owned by

intermediaries. Producers of information interact with services and other processed information, such as orders, payments or instructions.

In reality, Internet commerce is about businesses and consumers adopting a new process or methodology in dealing with each other. These processes are in essence supported by electronic interactions that replace close physical presence requirements or other traditional means.

The phenomenal predictions of the size of the Internet market should be interpreted with some other factors in mind. There is scant evidence that the Internet and e-commerce is actually generating new sales. Certainly, the Internet is beginning to generate new sales channels, especially for products and services, which can be delivered digitally over the net. There is no doubt that bank-assumed risk from credit card transactions through SET (Secure Electronic Transaction) processes will accelerate traditional retail sales over the Internet. But these sales are still generally no more than sales substitution, or sales that would previously have been made by personal visits, mail order or the like.

An interesting report on Web shopping and purchasing data taken from a Nielsen Media Research/CommerceNet study on Internet demographics released to researchers in August 1998 (Table: 2.6).

Table 2.6: Top Items Purchased on the Web (June 1998 vs September 1997).

Items Purchased	**June, 1998 (million people)**	**September, 1997 (million people)**
Books	5.6	2.3
Computer Hardware	4.4	2.0
Computer Software	4.0	2.8
Travel (airline tickets, hotel & car reservations)	2.8	1.2
Clothing	2.7	0.9

Indeed, there are some authorities who are already claiming that this is the main benefit of the Internet to date-better customer service. There is no debate about where future investments will be made that is business-to-business, or back office processes. The technologies and products which will enable businesses to do business with each other over the Internet and therefore achieve administrative efficiencies, cost savings and increased customer service is generally agreed to be attracting between 5 and 8 times the near-term future investment that business-to-consumer investment will attract.

E-commerce requires management to understand and evaluate the opportunity and, indeed, the risks. Information technology plays a pivotal role, allowing information to be exchanged and transactions effected more quickly and efficiently; delays, errors and, ultimately, cost to be reduced; service to be improved and efficiency increased. The rapid rise in business use of the Internet and World Wide Web serves only to underline the importance of such new ways of working. It is of supreme importance that today's business practitioner, in whatever market sector, takes full advantage of the opportunities e-commerce offers.

E-commerce is transforming the way business is conducted, improving the speed, accuracy and efficiency of business processes, and fundamentally changing business relationships. With the advent of the information age, the pace of change is often bewildering. Faster, better, more accurate and more frequent communication is the name of the game. In today's rapidly changing business environment, success or failure may hinge upon a company's ability to capture and act upon the vast quantities of information now available. Organisations must exploit new ways of working, not just to compete but to survive:

- radically reduced time to market,
- improved customer relationships,
- easy access to global markets, and

- the opportunity for even the smallest company to compete worldwide with much larger rivals.

These are just some of the reasons that, as competition goes global, e-commerce is set to be an increasingly vital tool in the race to service customers, wherever they are. While estimates vary, analysts all agree that the next few years will see an explosion in e-commerce.

According to Iacovou et al. (1995) and Poon and Swatman (1995) performance factors for using the Internet include:

1. reduced transaction costs;
2. better customer service;
3. more efficient information access;
4. global communications; and
5. shortened communication cycles.

This study indicates that the success factors of conventional IT published in the literature, are also relevant to Internet use, in particular the perceived benefits and management commitment. In addition, factors such as the presence of systems analysts and the number of administrative applications appear to be less important than the attitude of staff and management.

E-commerce implementation varies significantly by industry. According to a recent survey, retailers and wholesalers were far more likely to implement e-commerce when compared with manufacturers. In addition, consumer goods industries led industrial goods industries in e-commerce implementation. A 1997 survey (conducted by E&Y Consultant Company) shows that the primary reasons for using e-commerce, in ranked order were:

- to respond customer/supplier request more effectively;
- to gain real-time access to information;
- to cut costs;
- to increase the accuracy of data with a concurrent reduction in errors; and
- to gain a competitive advantage.

These benefits, particularly cost reduction and sales increase, are most likely to be realised by large companies, which integrate e-commerce into business systems. Transaction costs may not be substantially lower for smaller companies that implement e-commerce; instead, small and mid-sized companies primary rationale to implement e-commerce is the competitive advantage it can provide.

2.4.3 Business Value of E-Commerce

The cost-benefit justification of Internet access and information systems in general is, and always be, a difficult one to prove, but due to access of real-time data, this would provide long term benefit of immeasurable value. To be able to analyse the value of Internet commerce usage, it is helpful to have a measuring ruler. For individuals, one can compare the cost of an Internet connection to the cost of using the telephone. It has been demonstrated that e-mail is cheaper than phone to communicate long distance with a number of people.

Internet commerce usage can make it possible to reduce the amount of time or effort required to perform certain tasks: cost savings and benefits from providing sales and customer support online, and increase the potential of collaborative partnerships established over the Internet. The primary reasons for implementation of Internet commerce is illustrated below in Table 2.7.

Table 2.7: The Main Reasons for Implementation of Internet Commerce (Source: Computerworld, 1998)

Reason for Using Internet Commerce	Percentage (%)
Cost Savings	35
Customer Service	32
Revenue Generation	18
Marketing	13
Others	2
Total	100

Many businesses are using the Internet to contain long-distance telephone and mailing costs. Recent studies have shown that businesses can save thousands of dollars using e-mail, in lieu of some long distance phone calls and postal deliveries.

For example, with first-class letters costing 45 cents each, a mailing of 1,000 pieces to customers would cost $450 for postage alone, whereas the same information sent by e-mail would cost 2 to 3 cents each - and the messages would arrive in seconds as opposed to days or weeks. Overnight mail (which typically costs at least $4-$6 for each delivery) can not compete with e-mail for speed or cost. Long distance telephone charges, particularly international charges, are reduced by use of e-mail.

Businesses spend much more money than individuals on their phone. As an example, one provider's estimated cost of an Internet connection for a site of 15,000 users was about 8 cents per month per user. The same Internet connection for 100 users would cost about $12.50 per month which is smaller than the cost of $15 per month for a phone. In most cases, the cost of an Internet connection will be far less than an equivalent telephone connection and far more valuable in the long run. An average individual user spends $20 to $30 monthly on an Internet connection which compares favourably with the cost of a telephone line (Estrada, 1993).

According to Mougayar (1997) there are various types of key measurements that must be tracked prior to embarking on a full implementation. The old adage *"if you can't*

measure it, you can't track it" applies. Some of the important key elements to measure business value are: reducing costs, process simplification, improving customer service, generating new revenue and taking faster decisions.

There are various types of key measurements that must be tracked prior to embarking on a full implementation. Some of the important key elements to measure business value are:

- **Improving customer service:** Providing customers self-access to their accounts, transactions and orders, is a valuable service. The level of satisfaction for those customers interacting electronically will undoubtedly rise.

- **Reducing costs:** The most basic cost reductions could be related to publishing costs, which include the cost of production, printing and distribution. Furthermore, marketing and selling costs are also lower in an electronically enabled commerce environment.

- **Providing business intelligence:** In the e-commerce world, businesses need to know much more about their clients. E-commerce makes it possible to market to specific individuals based on their patterns of (purchasing and browsing) behaviour. Hence they need to capture, and to analyse, as much information as possible about each individual purchase (or cancelled purchase) in order to build up customer profiles. This is achieved in much the same way that neighbourhood stores once did, through personal acquaintance with the consumer and continuous contact. The use of this analysed data leads to what is being called "*market response*" systems or "*adaptive marketing*".

- **Process simplification:** Instead of using paper, using the World Wide Web (WWW) simplifies and speeds the approval process.

- **Generating new revenue:** The new Internet-Based Electronic Marketplace generates new revenue by selling new products and services specifically designed for the electronic marketplace. Existing product or services can also be sold on the Internet.

- **Taking faster decisions:** By receiving information about competition through an Intranet information retrieval database, it would be possible to develop a competitive strategy much faster than otherwise. The drivers for manufacturing are customer's needs and time. Time is a major source of competitive advantage and competitive pressures requiring production schedules to be shortened. It is clear that the pro-active drives in e-commerce implementation are related somehow to the Just-in-Time (JIT) philosophy. Thus, e-commerce can be treated as an effective tool, which contributes, to the JIT process.

To date the major benefits from the Internet include improved internal and external communications. The Web has specifically brought a new marketing medium and enhanced information resource. Innovative applications are starting to appear which allow for sales and database interrogation. Other benefits such as e-mail and file transfer functionality, Web utilisation gave many companies *'Internet presence'* and provided them with opportunities to develop and expand new services.

In manufacturing, traditionally Design Engineering, Procurement and Production Departments communicate with each other using paper-based methods. However the introduction of Internet–based e-commerce and its superiority of over traditional EDI is adding a new dimension to reducing the cost of manufacturing. Improvement in the movement of raw material, Work-In-Process and Finished Goods is likely to occur as a result of using e-commerce. The main benefit to manufacturing lies in using the Internet for the second and third types of flow. The following figure (Figure 2.6) illustrates how clerical and production information can be efficiently communicated throughout the supply chain using the e-commerce. The number of parts used in production could be in

the order of thousands of items. These parts are usually purchased from suppliers on the basis of price, quality, and delivery on time and suppliers financial position and reputation in the industry.

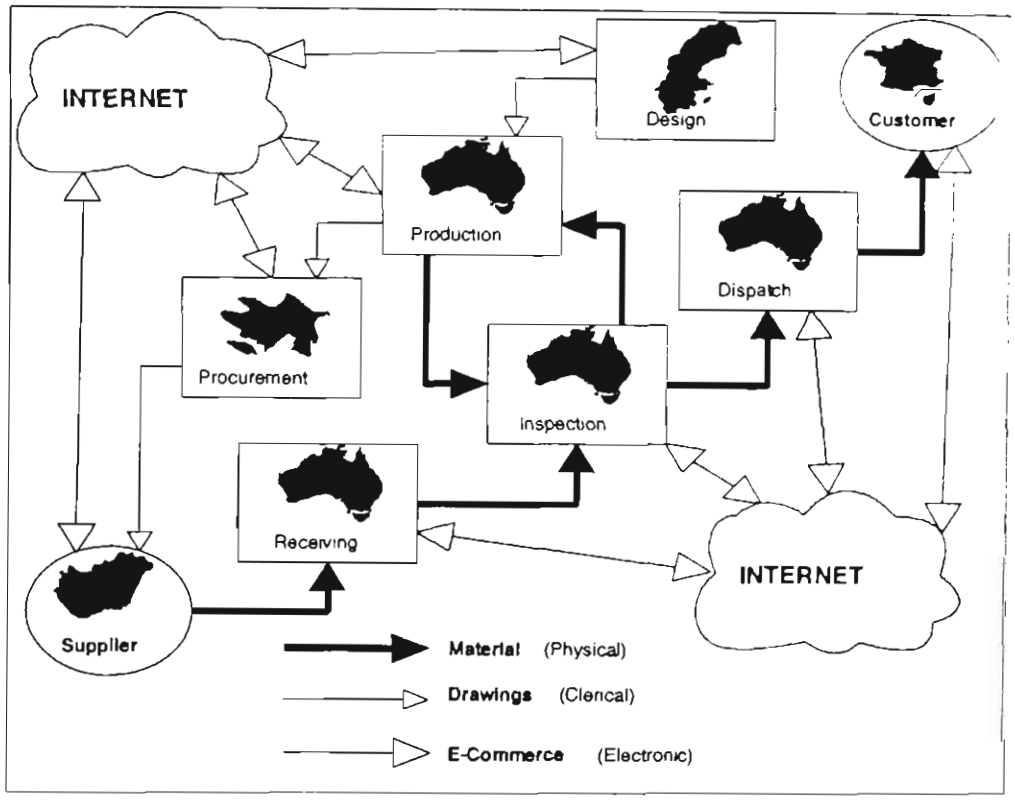

Figure 2.6: Supply Chain Communication in Manufacturing Using Internet-Based E-Commerce (After Gide and Soliman, 1997).

Accordingly, Material Procurement professionals must be equipped with timely and valuable information on parts and their suppliers. The Internet-based e-commerce provides them with a fast and efficient way of obtaining comprehensive information of the market, feedback from the industry and the performance of suppliers.

The reduction in time and costs in the whole manufacturing chain make it possible to gain competitive advantages in price, product innovation and service. Accordingly, using e-commerce is a significant factor in competition because it leads to shorter Opportunity to Delivery (O*to*D) cycle times and lower costs.

2.4.4 Internet Commerce Application Types

At the moment, according to e-commerce experts generally there are 3 types of e-commerce applications: Business to Business; Business to Consumer, and Intra-Business or Business to Employee (Figure 2.7).

- **Business-to-Business E-Commerce** is complementary to EDI in that it is beginning to be used for non-production, non-replenishment applications. The widely used current terms used to describe the function of e-commerce are "Business to Business" and "Business to Consumer". The expression "business-to-business" is inexact and sometimes misleading. Businesses-to-business e-commerce involves companies and their suppliers while consumer markets include home shopping, banking, health care and broadband--or high-power--communications to the home.

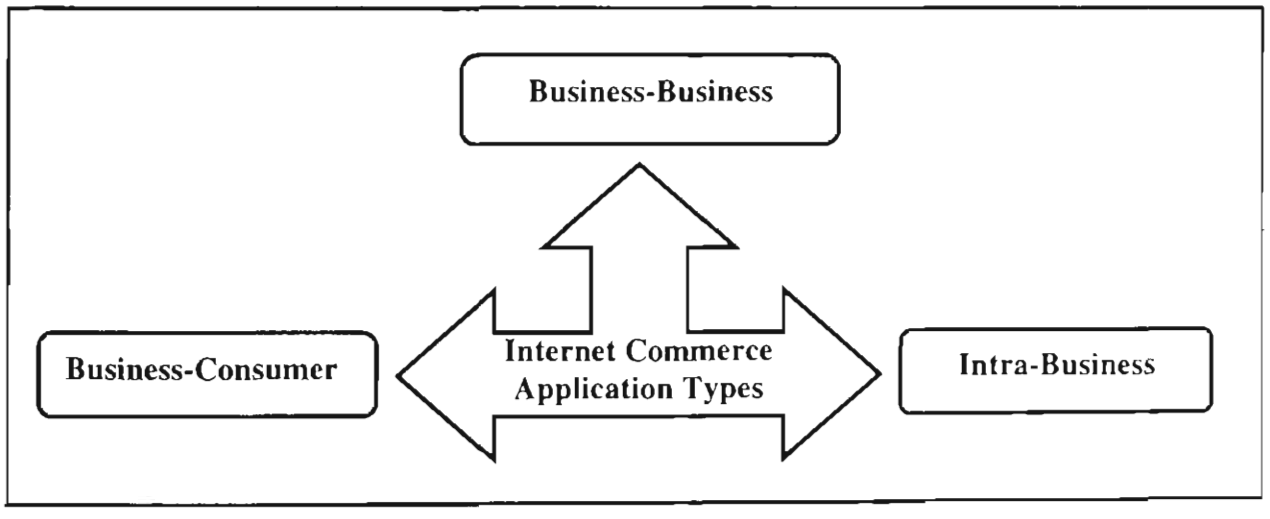

Figure 2.7: Electronic Commerce Application Types in the Virtual Market.

In e-commerce systems it is not always possible to tell who is accessing the automated point of sale/point of contact. It could be a retail consumer buying in wholesale quantities; it could be a business buying in retail quantities - and many other variants. Business-to-Business (non-EDI) automated ordering processes are

generally designed to empower business managers. The business server can only (normally) be accessed through the corporate Intranet, or an Extranet for "communities of interest". Once the log on process is completed then the appropriate catalogue is selected.

Ultimately all authorised suppliers' catalogues will be accessible by this business server. Suppliers' sites are not normally publicly promoted or advertised; they are trade sites, limited to their own closed user group of clients. Payment is made using a bank purchase card selected from an electronic wallet.

- **The Business-to-Consumer E-commerce** is designed to complement normal retail shopping, mail order and direct marketing. It can accommodate delivery of soft, or digital goods, such as published material, software, audio and video products. Figure 2.8 below shows how value-added chains will be established directly with customers bypassing traditional chains via the Internet-based e-commerce.

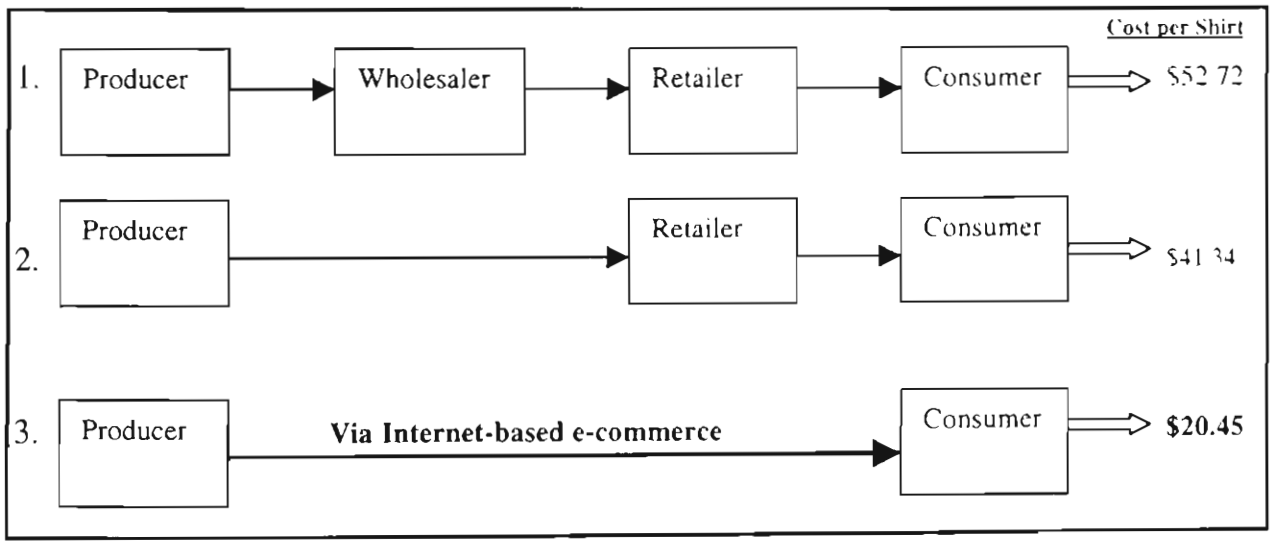

Figure 2.8: An Illustration of Business to Consumer Value-Added Selling Chain in the Shirt Industry (After Wigand and Benjamin, 1996).

- **Intra-Business E-Commerce** is beginning to develop a new market place. A checkpoint on an emerging application area. Majority of companies now allow employee to buy using the corporate Intranet. A variant from an emulated business-to-consumer application is where employees may have purchases deducted from the payroll, or from allowances. Allowances or entitlements for clothes or equipment are often the norm in the armed services, police, fire services, airlines, banks, health services and so on.

  Not only do these systems have to keep track of entitlements and usage, but accounts, sizes and up to date measurements, location and other variables. This application promises to be an important hybrid of business-to-consumer and business-to-business.

2.4.5 E-Commerce Benefits to Business Operations

To date the major benefits from the Internet include improved internal and external communications. The Web has specifically brought a new marketing medium and enhanced information resource. Innovative applications are starting to appear which allow for sales and database interrogation. Other benefits such as e-mail and file transfer functionality, Web utilisation gave many companies *'Internet presence'* and provided them with opportunities to develop and expand new services.

Gartner, a top industry consulting firm, has estimated business-to-business e-commerce will be 12 to 15 times larger than consumer markets for the next few years, with consumer sales only catching up with business markets midway into the next decade.

A framework for realising the optimum level of benefits from using the e-commerce over the Internet is illustrated below in Figure 2.9.

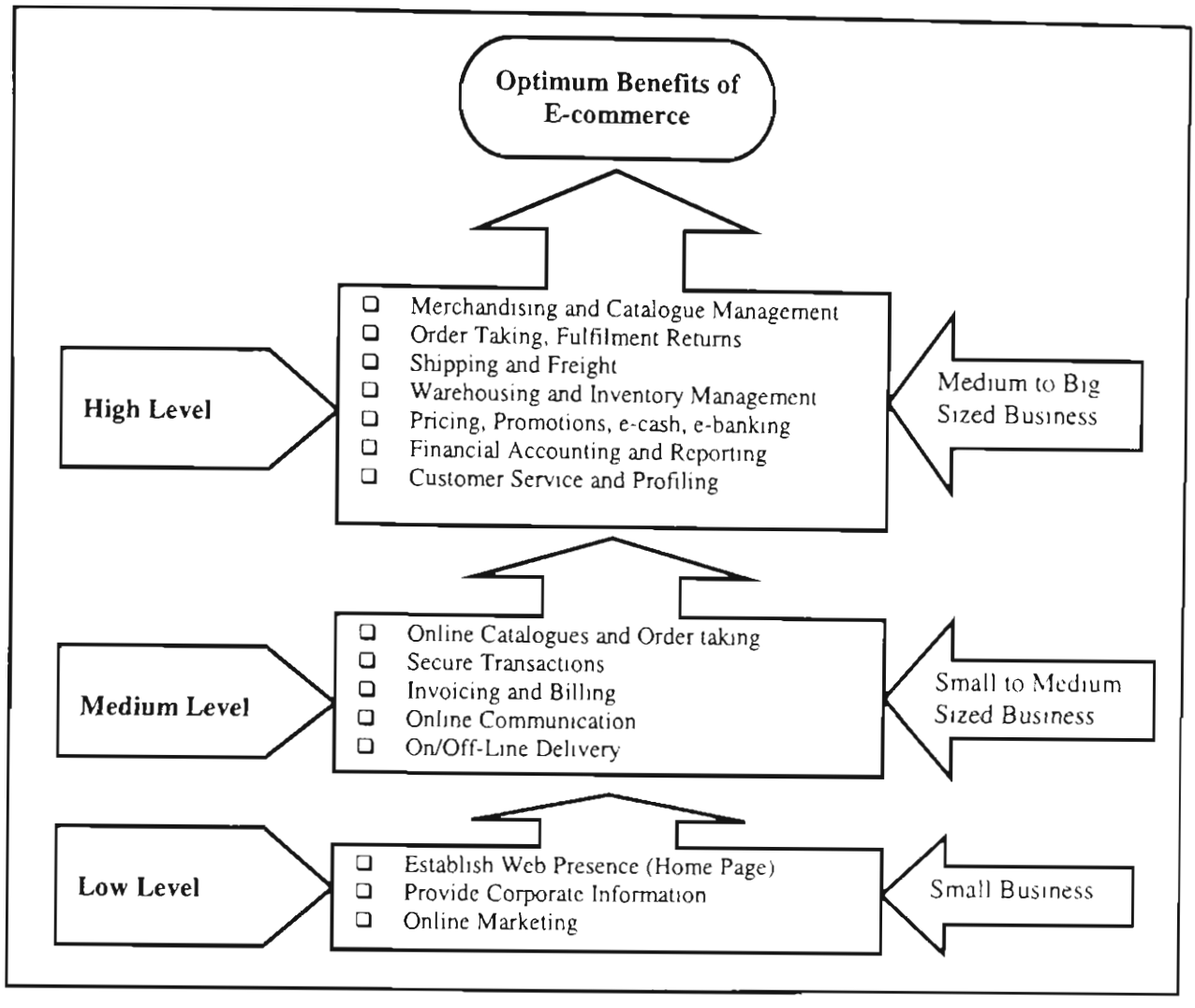

Figure 2.9: Framework for Optimum Level of Adaptation and Benefits of E-Commerce over the Internet (After Gide and Soliman, 1998).

According to Cisco Systems Inc., the leading maker of Internet equipment, estimated more than $1 trillion to $2 trillion worth of goods and services will be sold on the Net by 2002. According to Cisco, part of the reason for the low-ball estimates by market analysts is that many exaggerate the importance of business-to-business commerce and underestimate the potential growth of the consumer market, as the Net becomes more mainstream. Although sales between businesses will dominate e-commerce in the near term, Cisco estimates that by 2002 consumer-oriented business would represent 50 percent of the Internet economy. Sixty-four percent, or $5.6 billion of Cisco's revenues of $8.5 billion last year, were Internet-based.

2.4.6 Payment Process for E-Commerce Applications

As it was described above, there are numbers of payment methods available for e-commerce applications. At the moment the main acceptable payment methods for e-commerce are: account, cash on delivery, credit card, digital cash. Other payment methods are emerging, stored value cards or smart cards for example.

The difficulty with e-commerce - at the moment - is that all online payment methods are new and relatively untested. It is vital that the business obtains payment at no less favourable terms than it currently does. Similarly, the banks involved in the process want to be sure about security and costs of processing the transaction within their existing security and operating restraints. The shopper wants to be confident that the payment is directed to the intended recipient with no possibility of interception or misappropriation, and that the shopper suffers no loss of goods or funds as a consequence of shopping on the Internet.

It should also be remembered that Internet commerce is global. That is why, business servers and payment methods need to operate 24 hours a day, 7 days a week, 365 days a year. Hence payment methods need not only to be secure, they need to be automated, non-stop and foolproof. This requirement limits payment methods at the moment although probably for no more than 12 months at the most.

Some of the latest transactional banking statistics in Australia are:

- Over 10 million non-cash transactions are made in this country each day, with a total value of approximately $90 billion, ie cheques, direct entry and EFTPOS.
- Cheques are still the most common method of non-cash payments but their overall share of the number of financial payments has declined in recent years in favour of EFTPOS and credit payments.

- The number and value of cheque transactions in this country each day appears to be holding fairly steady. (An estimated 3.7 million cheque transactions per day at a value of $23 billion was recorded in APCA's November 1996 survey).
- A recent US Banking Journal stated that cheque usage per capita in the US is currently running at about 140 cheques per year and is expected to continue to grow and peak in the year 2005. Interestingly cheque usage in Australia is currently around 50 cheques per person on a per capita basis.
- The number of direct entry credit and debit payments made per day in November 1996 was 1.6 million and 0.4 million respectively; these numbers have not changed significantly over recent years.
- The value of direct credit and direct debit payments made per day in 1996 was $4 billion and $1.6 billion respectively. More recent information is not yet available.

On the other hand, there is confusion over the availability and choice of Internet payment tools. In addition, there are no interoperability standards to make one work with another. Over the past two years, new payment tools from small companies have emerged.

There are many traditional methods of payment available in the real world such as: Cash, Cheques, Credit Cards, Traveller's Cheques, Prepaid Cards, Debit Cards, Physical Tokens, Bank Notes, Secure Wire Transfers, Money Orders, Letters of Credit, etc. However, none of these mechanisms is directly transferable in an unmodified form to suit the Internet. This is because each method assumes a physical presence or that there is a delay incurred in the processing of funds so that fraud can be detected and stopped. Some of the new e-commerce payment tools that can be used in business operations are:

- ***Electronic Cash (Digital Cash)***- It is a token-based currency which translates into equivalent real currency units that are guaranteed by a bank. Usually, there is a trusted authority that allows the user to conduct and pay for transactions of this

nature. This usually takes place after a pre-determined relationship has been established (eg DigiCash).

Electronic cash covers a number of products. It includes multi-purpose prepaid cards, sometimes called "electronic purses" or "stored-value cards" which contain an imbeded microprocessor. It also includes prepaid or stored-value payment mechanisms stored on personal computer hard-drives that can be used for executing payments over the Internet. These are sometimes called "digital cash". Such a definition is not out of line with those used by official bodies such as the Bank for International Settlements and the European Monetary Institute. But electronic cash is still in development stage and it would be foolish to pin down too precisely what electronic cash is and what it can and cannot do.

Electronic cash is a smart card or personal computer containing electronic records representing value that can be used in payment for goods or services. It may also be useful to consider some of the things that make electronic cash different to what are referred to as "access products". These are products that allow consumers to use electronic means of communications to access otherwise conventional services. Debit cards and credit cards, for example, allow the holder to access funds electronically from a bank account or credit line. Electronic cash on the other hand is self-contained with all the necessary electronic records stored on the device.

- ***Smart Cards*** – These can be used with or without a stored value. Usually, the user is able to pay with them without having to connect to a remote system. If they have a stored value which contains "real digital cash", they are known as "Cash Cards" because they replace carrying cash (eg Mondex).

- ***Electronic Cheques*** - These are the equivalent of paper-based cheques. They are initiated during an on-screen dialog which results in the payment transaction.

Authentication and verification are usually performed instantaneously by using digital signatures and time-stamping controls during the transaction (eg CheckFree).

- ***Encrypted Credit Cards*** - These are varying degrees of encryption implementations of credit cards over the Internet, with the SET (Secure Electronic Transactions) holding the most promise (eg CyberCash).

2.5 COMPETITIVE ADVANTAGES OF USING INTERNET COMMERCE IN BUSINESS OPERATIONS

All types of companies whether service or manufacturing are facing a rapidly changing business environment and very fast advances in information technology (IT). These changes have occurred due to increased global competition, significant advances in international business, and changes in political and economical environments around the world.

Increased internationalisation in the business arena has had a major impact on business organisations. Accordingly, business operations all around the world have began moving from the traditional methods of communication to the Internet-driven e-commerce. The development of Internet-based e-commerce offers the most exciting business opportunities in the marketplace. Intelligent manufacturers must re-evaluate every aspect of their strategy and operations from customer service to marketing, product development to retailing, logistics to distribution. Therefore, the Internet-based e-commerce is becoming essential for companies entering the cyber-marketplace.

To be able to gain competitive advantage through information technology (ie. e-commerce) manufacturing managers must understand not just the technology but also the "value chain" in which their company operates. Information technology will have an impact on each activity along the value chain. In fact, information technology is transforming the way value activities are performed and the nature of the linkages

among them. These basic effects explain why information technology (Internet) has acquired strategic significance and is different from many other technological business use. The Internet can make a significant contribution to each component of a company's value chain (Cronin, 1994). To uncover and evaluate new avenues for competitive advantage through use of the Internet, companies need to analyse their relationships with suppliers and vendors, the existing role of information in the organisation of the company, internal production mechanisms, and the points of contact with customers. Intelligent manufacturing management via e-commerce to gain competitive advantage is shown below in Figure 2.10.

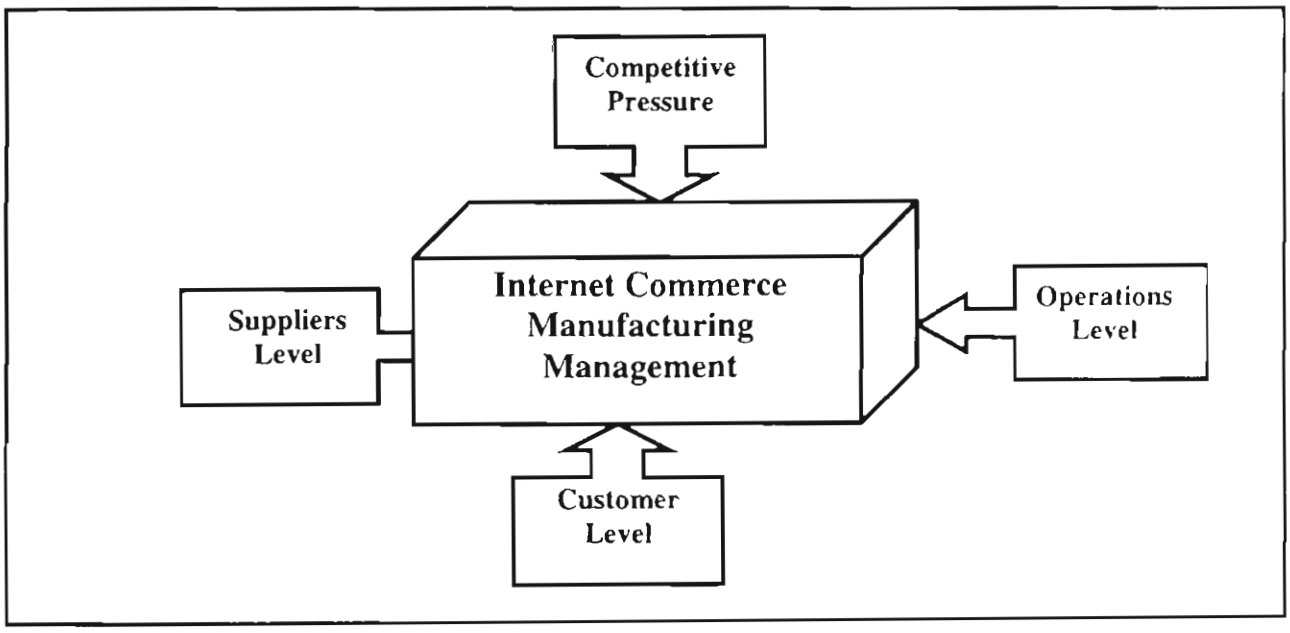

Figure 2.10: Manufacturing Management via E-Commerce to Gain Competitive Advantage.

2.5.1 Internet Commerce Manufacturing: Suppliers Level

The Internet provides very fast, reliable connections to suppliers around the world. Companies can communicate with vendors in any location, without incurring additional communication costs. It is difficult to convey complex bids or cost estimates accurately over the telephone, and if the vendor is in a different time zone even scheduling

telephone calls can be problematic. Large amounts of data are also cumbersome to transmit via telefacsimile. Even overnight delivery of information may be too slow when critical decisions are waiting to be made. Many vendors offer electronic pricing and ordering information to overcome these limitations. However, adopting one vendor's proprietary online system may limit a company's flexibility to change vendors.

On the other hand, electronic distribution of software, publications, and other items provides immediate access to these products. Online tracking of orders and inventory ensures that companies are aware of delivery dates, and reduces delays in the distribution process. Many companies have found that product support over the Internet significantly reduces the time lost due to system performance problems (Cronin 1994). For some companies, the efficiencies and cost savings generated by dealing directly with suppliers over the Internet have more than justified their investment in the network.

2.5.2 Internet Commerce Manufacturing: Operations Level

The global connectivity of the Internet offers companies immediate savings in long-distance telecommunications. A dedicated Internet connection allows unlimited exchange of data and e-mail with locations around the world. Even a low-cost, shared dial-up connection with an hourly-use charge is more economical than long-distance telephone charges.

In the longer term, the ability to exchange information quickly and easily facilitates the relationships with business partners and customers, encouraging more joint ventures. For employees, connecting to an international information source promotes global awareness. It allows companies to monitor economic and political developments in countries targeted for market expansion.

Furthermore, information resources and discussion groups on the Internet provide employees with direct access to virtually unlimited advice and information. By helping

them to answer questions and retrieve relevant materials, the network connection increases their productivity. Teams can exchange data and discuss results with colleagues in other organisations.

The Internet also facilitates more effective deployment of human resources. Network links support telecommuting and allow small, remote offices to participate more actively in company-wide programs and contribute to joint projects. When project teams are being formed, managers can select members based on their expertise, without regard to geographic location.

2.5.3 Internet Commerce Manufacturing: Customer Level

The Internet is a powerful tool for market research, for establishing new markets, and for testing customer interest in emerging products. Thousands of discussion groups and bulletin boards are available for keeping in touch with new developments through environmental scanning, as well as for direct contact with customers.

Manufacturers and producers of electronic information or software can deliver these items instantly to customers and collect payment via the Internet. Electronic catalogues offer products and services to millions of users browsing through the network. Vendors can offer online help services and product support without additional expense of dedicated connections to customers.

The Internet allows direct interactions with customers to be spread through many divisions of a company; technical and development staff, documentation providers, production workers, and researchers find out first-hand how customers respond to company products. They can address problems and provide customer support as a team.

Table 2.8 below shows the Internet commerce manufacturing value-chain.

Table 2.8: Internet Commerce Manufacturing Value-Chain Management

INTERNET COMMERCE CAPABILITY		MANUFACTURING BENEFITS	COMPETITIVE ADVANTAGE
SUPPLIER LEVEL	**Pricing and Ordering**	• Easy, efficient access • Information constantly updated • Not looked into proprietary system	• Lower cost of obtaining materials
	Deliver/ Order Tracking/ Online Inventory	• Faster turnaround • Improves planning • Less inventory stockpiled	• Faster, more flexible delivery
	Product Support	• Direct access to expertise • Interactive • Faster problem resolution	• Improved reliability and performance
	Global Connectivity	• Savings in telecommunications • Improves connections to business partners and customers • Promotes global awareness	• International reach
OPERATIONS LEVEL	**R&D/ Collaboration / Sharing / Distributed Resources**	• Facilitates business partnerships and joint ventures • Shortens development time • Disseminates resources more broadly	• Flexibility and effectiveness in information - based activities
	Location-Independent Work	• Flexible work arrangements • Telecommuting and contract employees • Virtual teams based on expertise, not location	• Increased productivity
	Marketing and Product Research	• Data for market research • Establishes consumer response to new products • Environmental scanning	• Increased market share
CUSTOMER LEVEL	**Sales & Distribution**	• Reaches new customers • Low cost distribution method • Electronic catalogues • Multiplies contact points at no incremental cost	• Lower cost margins
	Support & Customer Feedback	• Access to customer comments on-time • More staff in contact with customers • Immediate response to customer problems	• Enhanced customer satisfaction

In addition to that, strategic use of the Internet based on an analysis of the value chain encourages companies to focus on areas where they can measurably improve performance. If a company decides to distinguish itself through the quality of its customer service organisation, the network can be a decisive asset in achieving this goal. If the emphasis is on developing and marketing innovative products, the Internet connection will contribute at a different point in the value chain. The benefits of the Internet will vary from business to business. One thing is certain that for companies seeking competitive advantage, the global network is an essential management resource.

2.5.4 The Competitive Benefits of the Internet Commerce

In this rapidly changing environment, businesses are taking a look at their own organisations, structures, and processes in an effort to become more competitive. The Internet is a wonderful tool for engaging in these activities. The competitive benefits of the Internet commerce for intelligent manufacturing are illustrated below in Figure 2.11.

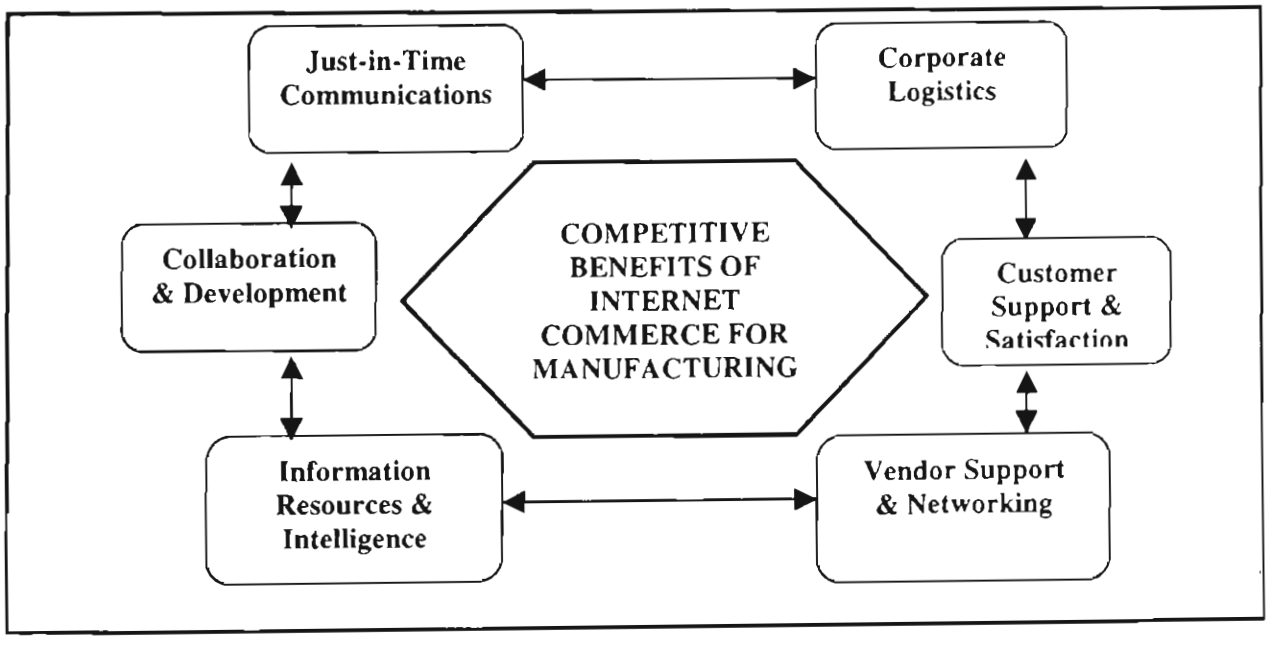

Figure 2.11: The Competitive Benefits of the Internet Commerce for Intelligent Manufacturing

In manufacturing industry, many companies are using e-mail and group conferencing to engage in business process re-engineering projects. Maintaining good communication to exchange data and documents is critical in the re-engineering of business processes. In addition, the ability to have the latest information about marketplace and awareness of the state-of-the-art in industry allows companies to keep their competitive edge. Learning what other companies are doing, knowing the kinds of information available, and discovering new markets can assist a company in maintaining a competitive advantage. Businesses enhance these efforts by being connected to and active on the Internet.

More companies use the Internet in the search for "best practices." As businesses try to become more competitive, many want to find existing practices that can help them improve their activities. As the Internet is a two-way knowledge bridge, the exchange of public information is crucial for meeting the needs of customers, business partners, and collaborators, as well as the general public. In some cases, businesses are using the communications abilities of the Internet to engage in a Total Quality Management (TQM) plan. Some companies use the Internet to maintain corporate process control across all company locations. Many companies use the Internet to search for successful practices of corporate and product improvement. In some cases, this search is overtly part of a TQM plan, or it may simply be a way of finding new solutions to problems.

Furthermore, competitive advantage can be increased due to access to state-of-the-art information on products, materials, new ideas and even the status quo in a given industry. What are other businesses doing? What kinds of information are available? Who are the main competitors in a specific business? The Internet mailing lists are very important sources for keeping track of industry and government standards; in addition, various government databases also maintain regulatory and standards information. Many corporations use the Internet to engage in what some call "techno watch"- keeping a finger on the pulse of emerging and new technologies, and the market response to those technologies, both anecdotal and in terms of financial performance and the stock market.

Having the most up-to-date information about business markets and the state-of-the-art in industry allows companies to keep or increase their competitive edge. In some cases, the Internet is a tool for solving problems by accessing information, documents, and experts. Many companies cannot afford in-house experts on every process or activity, and use the Internet to locate and network with experts, through the mailing lists or through e-mail.

◻ Just-In-Time Communications

The Internet offers a business the opportunity for Just-in-Time (JIT) communications with people and organisations across the globe, enlarging the visibility of a business a thousand-fold. Being on the Internet allows a company to truly have a world market. Because of inexpensive access, the Internet is connecting even small, rural industries. Although the corporate giants certainly produce a great deal of traffic, the global network keeps small, out-of-the-way businesses in touch as well. Good communications enable more global corporate management control, aiding in consistency of results. Companies can be in touch with suppliers, branches, and subsidiaries in an effort to exert more control over variables. Companies can establish, negotiate, and maintain standards online. Moreover, businesses can improve employee morale by involving them in discussions about the business even outside their own units.

As an Internet tool, e-mail is a low cost method for maintaining local, regional, national and international communication. Messages can be exchanged in minutes as opposed to days or even months using regular mail. Often, the first and most frequent business use of Internet connectivity involves internal and external communications. Use of the Internet enables businesses to be in touch with branches and work teams at many locations, and permits high-speed access to vendors and customers. This can establish a virtual community in which people find themselves in conversation about substantive matters. Corporate culture is being affected by e-mail - some people become more communicative because they prefer sending e-mail to talking on the phone.

Businesses use the Internet to keep departments, work groups, and individuals in close contact. Listserver software allows work groups to communicate in an open manner similar to virtual meetings, and can serve as an ad hoc tool for Total Quality Management (TQM) or process re-engineering projects. This can help team members keep in touch and involved even while they are travelling. Use of e-mailing lists can greatly facilitate electronic conferencing, since the members can participate at various times and from various locations. Furthermore, improving communication with colleagues, government agencies, the academic community, researchers, and even competitors, can help improve the industry in general.

- **Corporate Logistics**

Logistical concerns can dominate production planning and customer service issues for a manufacturing corporate. Since the Internet is the anywhere-anytime-network, employees, suppliers, customers, and others can keep in touch more efficiently. The use of e-mail and teleconferencing facilitates communication between markets. Because, when communicating via e-mail, Listserver, and electronic conferences, not all participants have to be in the same place at the same time to conduct business.

In another words, businesses can maintain communications by way of an 'asynchronous method,' meaning that both parties do not need to be online or in the same place at one time; rather, parties can exchange mail and information across time and distance freely. This method reduces the need to be aware of time zone differences and variations in the phone and mail systems of various countries. Using the Internet lessens logistical concerns because employees do not need to be in the same room or city for meetings. Companies can establish and edit documents collaboratively in this asynchronous environment.

In addition, real-time communication is also possible. Using the Internet for communication removes distance and time barriers. The Internet is the "any-where/any-

time" network, so exchanges with markets in Europe and Asia (across time zones) can be facilitated by the use of e-mail and conferencing. Listserver or group computer-conferencing software is another tool that can improve internal and external communications by helping to overcome logistical concerns. These services can help keep members of a work unit up-to-date and involved no matter where or when they log in.

- **Collaboration and Development**

The development team and project participants often use the Internet to keep in touch, and to exchange data, programs, and working papers from far-flung locations. The Internet also allows several small businesses to band together much more easily for product development. In another words, formation of partnerships among companies is increasingly common, and the Internet facilitates this collaboration for product design, vendor channels, research, and development.

The Internet is used as a medium to explore collaboration possibilities, without incurring heavy time or expense overheads. This is achieved through enquires posted on a mailing list and a number of Usenet newsgroups. This enables the manufacturer to make contact with a user who has published on this particular issue. Although the Internet is a very useful tool to explore collaboration possibilities, further consolidation of the initial business contacts requires more direct interaction or perhaps another communication medium.

On the other hand, companies tended to maintain separate corporate projects, or would establish a new vision or production unit to handle a specific problem. Now, many companies are temporarily pooling resources to put out a new product or service, and are using the Internet to do this through e-mail, group conferencing, and exchange of spreadsheets, documents, drawings, pictures, and sound files. Such groups allow those in marketing, research, engineering, and accounting to keep track of and provide input on a

project through every step of its development. This ongoing discussion helps to keep projects on-track by ensuring that the needs of the various business units are included as integral parts of a plan.

Furthermore, with the advent of new managerial styles, bottom-up product development, and the establishment of lateral work teams, the Internet facilitates new ways of doing business and maintaining communication. Collaborative approaches have been greatly enhanced by the Internet with its wealth of information, its capacity of supporting telecommuting and time-shifted communication, and its success in linking far-flung enterprises seamlessly. Such collaboration adds to the positive atmosphere needed to compete in the marketplace.

- **Information Resources and Exchange**

With more than 80 million (1999) computers connected to the Internet, the system has a multitude of databases, Web sites, Usenet, Gopher sites, FTP (File Transfer Protocol) sites, Listserver discussion lists, and conferences. The amount information available is staggering. Scientific and research data is available in large quantities. Furthermore, some manufacturers find that the Internet is useful in helping employees learn new tasks and processes. There are many simulations, manuals, training aids, and tools available for software running on a variety of platforms, from UNIX tutorials to Windows tips and hints. There are also large quantities of instructional materials available online regarding the use of the Internet.

Information exchange increases the ability to seize business opportunities quickly and exploit them to the company's full advantage so that future competitiveness is consolidated. This is similar to the ability to perceive the market potential of a new product and carry out rapid product development to capture market share. Both the ability to conceive bright ideas and to make them work in practice, will transform intangible benefits to tangible outcomes through Internet use. Furthermore, it appears

that the organisations can gain and preserve their edge by continuously applying entrepreneurship in business use of the Internet.

- **Customer Support**

One of the prime business uses of the Internet is in the area of customer support. Customers can reach a company on their own schedules - day or night - and obtain information from conferences, FTP, WWW, e-mail, and Gopher. The customer support information only has to be transferred to an archive once, and yet it may be accessed by thousands of customers and potential customers - a very labour - efficient and cost-effective way of distributing information.

A company with a presence on the Internet is perceived as modern, advanced, and sophisticated. Many companies maintain World Wide Web sites, Gophers, and FTP sites for customers use during working and non-working hours. These services enable customers to receive assistance, get product information, and leave questions for replies during working hours. Some companies offer information files on Frequently Asked Questions (FAQs) for customers and potential customers.

In this highly competitive and dynamic global marketplace, the company that can reach and satisfy customers will have an advantage - and the Internet can help in maintaining relationships with customers. With its global reach, the Internet can assist business in locating new suppliers and keeping in better touch with them to aid, for example, in zero inventory planning. Many companies, especially in the computer industry, maintain help forums on commercial services.

- **Vendor Support and Networking**

The Internet provides a fast method for networking with vendors and suppliers, increasing speed and variety in our procurement process. With its global tentacles, the

Internet can help businesses locate new suppliers and keeping better touch with them. In addition, small suppliers can network with and compete with larger, better-known suppliers. Furthermore, the Internet assists companies in maintaining low inventory levels because of speed of communications.

Relationships with vendors and outlets are maintained via the Internet. In some cases, companies are doing actual sales transactions on the Internet. In addition, if the product is correct usage Internet delivery, as with software and information, the actual product is delivered via the Internet. Some companies are arranging product delivery through the Internet, where companies can establish and support actual distribution channels.

2.6 MANAGERIAL IMPLICATIONS OF E-COMMERCE IMPLEMENTATION

Literatures show that resource availability play a vital role in enabling small companies to start e-commerce implementation. The motivations for implementation are internal and sales-focused. Sales-focused motivation is defensive in market survival and offensive in acquiring competitive advantages. Internal-focused motivation is originated from the desire of senior management that internal benefits can be obtained on the successful implementation of e-commerce over the Internet. The centralised decision making mechanism can be both advantageous and hindering to e-commerce implementation. A commitment of the decision-maker to e-commerce facilitates a more direct and quick allocation of resources to the process.

With the influence of senior management, a more committed workforce is expected. This would ultimately lead to better results of the e-commerce implementation. On the contrary, a budgeted funding or training for e-commerce can be withheld by the manager if other projects get the priority. This, at the end, will deteriorate the commitment of the workforce thus making e-commerce implementation less effective and efficient.
Moreover, senior management of many organisations have in common the desire enforces the persistent commitment of management by devoting the time and providing

the resources to support the e-commerce process. Gaining management commitment and communicating that commitment credibly to employees is one of the critical success factors for achieving e-commerce implementation.

2.6.1 Success Factors of E-Commerce Implementation

According to research of literature, major forces behind e-commerce implementation are market/customer demand and benefits derived from the implementation and competitive advantage. Most companies started their e-commerce implementation in response to their customers' request; the requirement of the potential customers. These provide the practical evidence that market/customer demand is the major drive - initiating commitment toward e-commerce. Companies seeking e-commerce implementation also believe that they can achieve competitive advantage over their competitors. In fact, the research shows that e-commerce implemented manufacturers are picking up market shares from other non-implemented suppliers. Also, e-commerce implemented manufacturers are seeking company growth by expanding new overseas (global) markets in which e-commerce usage is a must.

The continuous demand for e-commerce is the result of promotion of the quality by government, customers, suppliers, competitors, and industries. However, people will only adopt e-commerce which is beneficial and practical to their organisations. There are internal driving forces, which are additional to the external forces, pushing the manufacturers toward the need to implement e-commerce over the Internet. To cope with these driving forces, people (executive/staff/employee) involved in the system are identified as a factor for the successful implementation of the e-commerce.

External forces (customer expectation/satisfaction) and internal forces (strategic/competitive benefits) provide the impetus for implementation. These are realised in market/customer demand and implementation of processes, both of which require the commitment and involvement from the personnel in the company. There is a

need for improving the understanding of know-how and belief/trust in communication channels. These form the fundamental element in the strategy of e-commerce implementation. More importantly, the continuous commitment of people is necessary to ensure that the implementation can be maintained in subsequent review procedures. A model for visualising the process and providing the basis for developing the strategy is illustrated in the Figure 2.12 below.

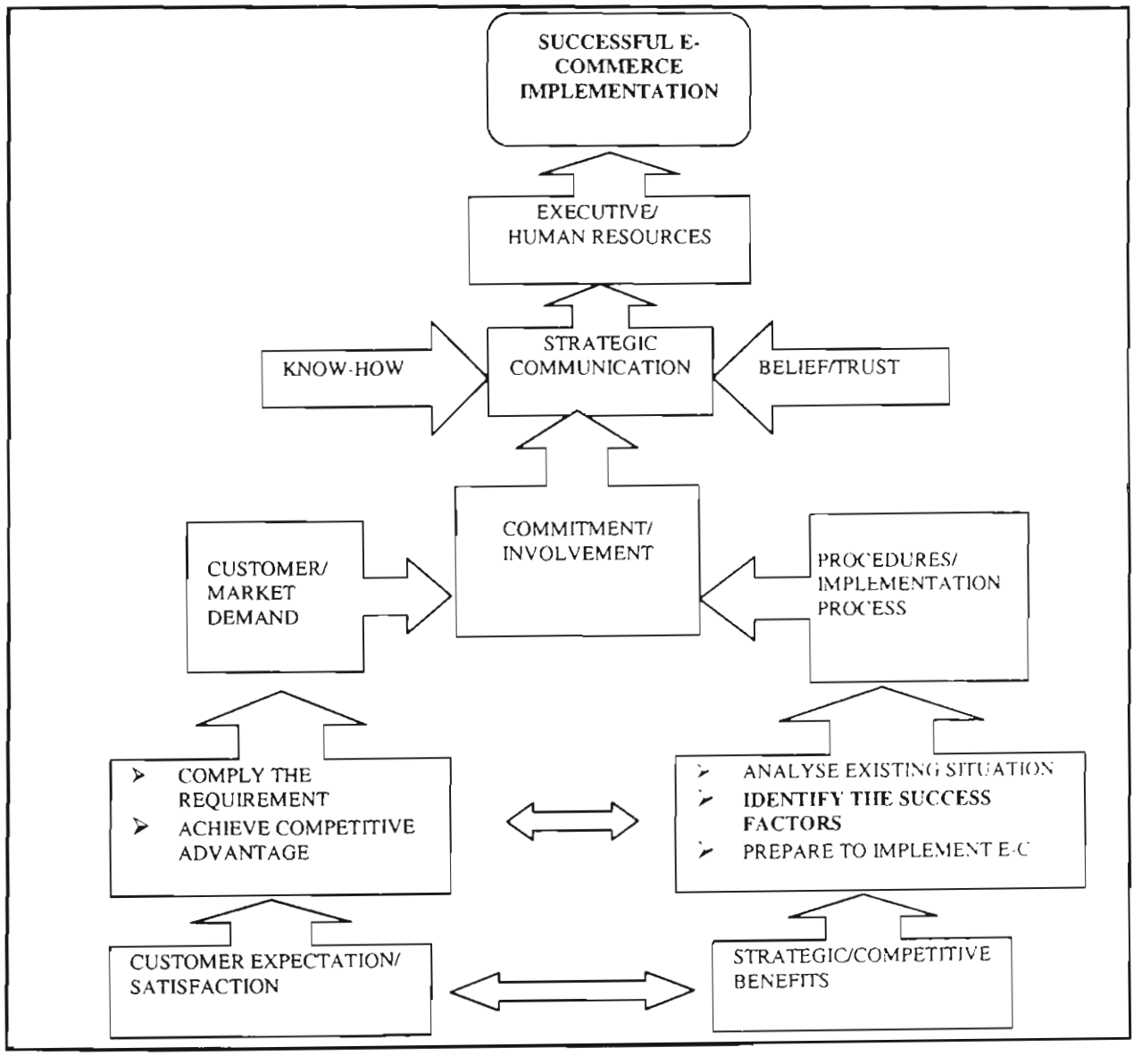

Figure 2.12: Success Factors for E-Commerce Implementation Strategy

2.6.2 Successful E-Commerce Implementation Processes

The successful e-commerce implementation strategy in manufacturing relies upon management and employee commitment and active involvement. This requires detailed planning of the activities. The model in Figure 2.13 is realised through the process elements, which are closely related to critically affecting the behaviour of people (executive/staff/employee).

Management should make an informed decision to implement e-commerce. This commitment is essential because the e-commerce process requires not only the involvement of the management, but also the resources that only the management can allocate. In small manufacturers, it is not always a case to establish a formal e-commerce information management project team as in large corporations. However, the information manager or executive/senior manager is the one who has responsibility to ensure that the e-commerce requirements are successfully implemented as planned.

The information technology manager/s or external IT consultant/s should provide training sessions on e-commerce knowledge. Besides, it is an effective way to visualise the management commitment toward e-commerce implementation. The fundamental process towards successful implementation of e-commerce is shown in Figure 2.13.

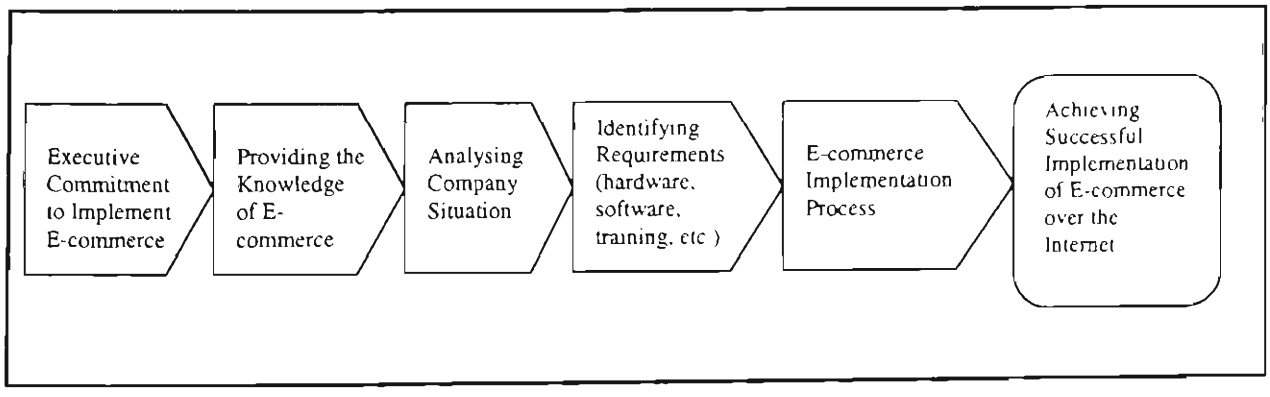

Figure 2.13: Successful E-Commerce Implementation Process over the Internet

Along with the adaptation process, the organisation needs to determine its starting point to continuously measure progress and evaluate the benefits gained from e-commerce implementation. Gaps in process steps can be identified when comparing the current system with the e-commerce requirements. It enables the management to determine the necessary efforts and resources to be allocated to the areas of importance.

2.7 CURRENT CHALLENGES TO INTERNET-BASED E-COMMERCE

According to Nelson (1997), the greatest value of e-commerce is in the strategic areas, such as the provision of better levels of customer service and improved marketing competitiveness.

On the other hand Socka (1996) stated: "Internet-based organisations such as CommerceNet have the potential to displace the established Value Added Networks (VANs)". In addition, Socka (1996) also reported that many companies had trouble implementing the necessary communication tools for EDI. For example, incompatible hardware, communication protocols and data file layouts made it difficult to turn one firm's purchase order into another company's sales order. Furthermore, computers do not communicate directly with one another but rather through a common Value Added Network, which is designed to overcome all these gaps. But in reality, the use of a standard Value Added Network format meant different protocols are required for different systems. This has led to incompatibility and disappointments.

The problems with e-commerce have been summarised by Pickett et al. (1994) as:

- *Insufficient business volume to justify EDI implementation*: Small firms do not see ample benefit from EDI. For example, small companies do not indulge in large transactions.

- *Non Value Added Technologies:* Small companies are nervous and overly cautious when it comes to spending money on technologies that are not absolutely necessary for their operations (ie Non Value Added technologies).

- *No short-term pay-off*: Traditionally small firms favour investment with short payback periods.

- *Hard hit approach*: Big companies dictate the type of network, the specific hardware and software, the standards to be adopted and the deadlines. Small firms dealing with large ones see the action of the big companies as an economic injustice but they lack the power to confront.

- *Other problems*: Lack of education, inevitable changes caused by EDI (like fear of change, administrative changes, physical changes, etc.) and data security issues.

These real problems prompted many companies to search for alternatives such as using the Internet to conduct their business operations (e-commerce).

Like any other IT tools, e-commerce is not without drawbacks and limitations. There are two main drawbacks or challenges in using Internet-based e-commerce, these are: security issues and payment tools. These two issues are receiving the highest priority and the best attention they deserve, both from vendors and users and implementers.

For e-commerce to really transform the way we do business a secure solution that works globally is required. To achieve this, a series of international standards needs to be agreed upon and vendors need to carry out a rigorous program of interoperability tests. Moreover, as trade moves beyond national boundaries, a common legal infrastructure must be agreed. For example, a contract that has been digitally signed in one country needs to be recognised in other countries.

On the other hand, challenges from the internal organisation caused one of the biggest obstacles to e-commerce. This is because e-commerce can be treated as a stimulus in a revolution. Some companies do not have a clear budget on e-commerce implementation. However, the managers would provide the necessary resources if e-commerce comes to the priority of the company targets. The various internal difficulties encountered by the companies during the e-commerce implementation process are:

- Lack of time
- Lack of clear budget
- Benefits can not be evaluated
- Overloading of work
- Competition for resources
- Insufficient training
- Not supported by employees

External difficulties came from three sources; customers, suppliers and consultants. Some of the difficulties are:

- Customers are not using an IT system as an assessment criterion to select suppliers
- Suppliers do not support e-commerce implementation
- External consultants are costly but not helpful

Moreover, research show that about half of the organisations recruited external consultants to assist their e-commerce implementation process. However, not all the organisations were satisfied with the performance of the consultants. Some of the organisations complained that external consultants were costly but not helpful. An ineffective consultant not only adversely affected the bottom-line, it also caused unnecessary delay to the e-commerce implementation.

Some international surveys show many companies found that e-commerce implementation was expensive. The direct costs of obtaining and maintaining e-commerce are the computer software solutions and hardware and IT consultation fees. Some businesses do not consider that the implementation can induce new orders although e-commerce can improve the image quality of the company.

According to research, some companies considered that the relatively high initial software and hardware costs of full implementation, and security and privacy concerns, would prevent them from implementing e-commerce. No other factors appear to have a dominant effect. However, some other common drawbacks include the followings:

- Lack of knowledge about e-commerce
- The belief that total benefits cannot cover total costs
- Inappropriateness of e-commerce in their industry
- E-commerce implementation will not be supported by employees
- Extensive IT/IS changes are required
- Top management does not understand e-commerce and hence does not recognise its benefits
- Too difficult to learn and implement
- Total costs unaffordable.

Companies with larger employee size are more likely to implement e-commerce or to be in the process of implementation. This suggests that the accessibility to other sufficient resources in larger companies enable them to start the implementation process earlier and obtain the system quicker than the comparatively smaller companies.

Some experts admit that the Internet gives a platform where small companies can do business with one another as well as with large suppliers. But they do not expect large corporations to abandon their well-structured and planned e-commerce networks in the near future. This is largely due to 3 main reasons, which are:

- *Security on the Internet:* Security on the Internet is a major problem. This is currently being handled by available encryption methods, but the biggest security threat is still there according to McCartney (1997).

- *No one owns the Internet:* One important issue is the overall network reliability that strikes as a structural feature of the Internet. No one is responsible for its performance. Orr (1996) states: "*If you have any problem, there is no toll free number you can call for customer service*".

- *Heavy traffic may delay the business operations:* It is also notable that heavy usage of the Internet can slow down the processes and ultimately affect the business.

There are two main drawbacks or challenges in using Internet-based e-commerce. These are *security issues* and *payment tools*. These two issues are receiving the highest priority and the best attention they deserve, both from vendors and users and implementers.

2.7.1 Security Issues

According to NCSA (National Computer Security Association, www.ncsa.com) (1996), in the US Internet security is about protecting three things:

- The confidentiality,
- Integrity,
- Availability of data.

The NCSA states that securing Internet commerce probably the biggest challenge that IS professionals have yet faced. The security problems affecting the three areas of Internet e-commerce as follows:

Credit card transactions: There is considerable, and justifiable, fear that confidential information, such as credit cards and personal details, could be intercepted during transmission over the Internet, for example when submitting an order form on the Web. The challenge is to transmit and receive information over the Internet while ensuring that:

- It is inaccessible to any one but sender and receiver (privacy),
- It has not been changed during transmission (integrity),
- The receiver can be sure it came from the sender (authenticity),
- The sender can be sure the receiver is genuine (non-fabrication),
- The sender cannot deny he or she sent it (non-repudiation).

Therefore, without special software, all Internet traffic travels "in the clear" and so anyone who monitors traffic can read it. This form of "attack" is relatively easy to perpetrate using freely available "packet sniffing" software since the Internet has traditionally been a very 'open' network. Most of the 'local providers' or ISPs (Internet Service Providers) are considered "easy attacks" by hackers (NCSA, 1996). Moreover once confidential information has been received from a client it must be protected on the server. Currently Web servers are among the softest targets for hackers, largely due to the immaturity of the technology.

Virtual Private Networks (VPN): This is a specialised form of encrypted Internet transaction allowing a secure channel (or tunnel) to be established between two systems for the purpose of electronic data interchange (EDI). Despite the general potential for greater security, the VPN is still a worrying development from a security perspective.

Digital Certification: This area will continue to grow in importance as companies seek trusted third parties to hold digital certificates. It can be used to electronically prove the identities of message senders and receivers, the integrity of documents (eg. that an

invoice has not been changed) and even the validity of digital media, such as sound recordings, photographs, and so on (NCSA, 1996).

On the other hand, a Forrester Research report found that security concern has fallen rapidly. This indicates that there is a growing confidence in solving the Internet security issues that have been very widely publicised. Even though security is a challenge it is not a barrier to e-commerce. Security is fairly new to the Internet, so it has not matured yet. However, computer security professionals have known about the lack of Internet security for years and are now improving it.

2.7.2 Payment Tools

There is confusion over the availability and choice of Internet payments tools. In addition, there are no interoperability standards to make one work with another. Over the past two years, new payment tools from small companies have emerged.

Moreover, analysts acknowledge that there are a number of problems facing management in using the Internet to conduct their business. *Some of these challenges are:*

- Providing high quality service to the customer.
- Maintaining service delivery capability, richness of experience and certainty of transaction.
- Generating profits as well as revenues.
- Increasing efficiency and effectiveness of business process.
- Deciding on the level of investment in this technology.
- What to do with existing Electronic Data Interchange (EDI), and when to shift away from it?
- How to use the Internet to create competitive advantage for tomorrow?
- How to focus on delivering solutions to the Internet commerce market-space?

- How to leverage IT leadership to drive growth and direction of the Internet market?
- How the Internet leads to best business practices?
- How to deliver a viable, cost effective and compelling Electronic Business solution?
- How to expand into new markets?

These challenges and the unknown answers to the questions raised above, warrant intensive research in this field of e-commerce.

2.8 THE FUTURE OF INTERNET-BASED E-COMMERCE

Internet-based e-commerce is still at an early stage of development (Kosiur, 1997). Many of the technologies that form its infrastructures are still experimental or at least not available in the large scale required by the Internet. Internet Technology is developing and changing so rapidly that it is difficult to predict correctly the future of Internet-based e-commerce. To say that the Internet of the future will be different from what it is today is a needless observation. The Internet is changing daily (Callon, 1997). New services are offered every day. However, expert predictions show that Internet-based e-commerce will dramatically change the way of conducting business in the near future. The earlier firms adopt Internet-based e-commerce the more likely they will survive and compete with their rivals.

Every firm will have to be successful at exploiting the Internet for e-commerce purposes. Success in Internet-based e-commerce does not have to be via WWW sites only, but more importantly it depends upon how a company strategically positions its products and services through other Internet-based electronic communities and intermediaries, as well as how it facilitates its interactions with customers, suppliers, and partners (Mougayar, 1997).

Over the next ten years, the growth of Internet-based e-commerce will outstrip the growth of traditional commerce. It is the commercialisation of the Internet that is leading

the way to this remarkable growth in e-purchases. The Internet serves as a foundation for all of these new opportunities in commerce. The following table (Table 2.9) shows the projected growth of e-commerce purchases over the period 1994-2005.

Table 2.9: Projected Growth of E-Commerce Purchases in Billions of Dollars (After Lynch, 1996).

		Estimate	
	1994	**2000**	**2005**
Traditional Commerce	$5,150	$8,500	$12,000
E-Commerce	$245	$1,650	$2,950
Proportion of all purchases	4.5%	16.2%	19.7%

The future of Internet-based e-commerce is not easy to forecast, even for those experts who are in the midst of changing technology and market process (Whinston, et. al., 1997):

- 1859: "*Drill for oil? You mean drill into the ground to try and find oil? You're crazy*!" Drillers whom Edwin L. Drake tried to enlist in his project to drill for oil.

- 1876: "This *telephone has too many shortcomings to be seriously considered as a means of communication. The device is inherently of no value to us.*" Western Union internal memo.

- 1920s: "*the wireless music box has no imaginable commercial value. Who would pay for a message sent to nobody in particular*?" David Sarnoff's associates in response to his urgings for investment in the radio.

- 1943: "*I think there is a world market for may be five computers.*" Thomas Watson, chairman of IBM.

- 1949: "*Computers in the future may weigh no more than 1.5 tons.*" Popular Mechanics, forecasting the relentless march of science.

- 1968: "*But what... is it good for*?" Engineer at the Advanced Computing Systems Division of IBM, connecting on the microchip.

- 1977: "*There is no reason anyone would want a computer in their home.*" A top executive of Digital Equipment Corp. (Selected quotes from the "Internet Grapevine: Wet Blankets Throughout History.")

- 1996: "*The Internet is the CB radio of the 1990s.*" An Internet sceptic.

CHAPTER 3

LITERATURE REVIEW

"Fool you are to say you learn by your experience?
I prefer to profit by others' mistakes, and avoid the price of my own"
Prince Otto Von Bismarck

3.1 GENERAL

The Internet-based e-commerce is rapidly becoming a business medium regardless business type or size around the world (Kalakota and Whinston, 1996; Vassos, 1996; Cronin, 1996; Mougayar, 1997; Crocker, 1997; Hoffman, et al., 1997). The rapid growth of the Internet over the past four years since the introduction of the first WWW browser in 1993, and the attention paid to it in the business press, has greatly increased interest in e-commerce (Kalakota, 1997). On the other side, there is no doubt that the Internet, as one lane of an emerging global information highway, is a growing force influencing strategy for all forms of electronic commerce (Senn, 1996). The Internet is presently the fastest growing computer network in the world and it is predicted that 120 million computers will be connected to the Internet with about 200 million users by the end of the decade (Bournellis, 1995).

For the last 10 years, considerable pressure has been placed on most organisations to make their operational, tactical and strategic processes more efficient and effective. According to Ho (1996), in any organisational environment, such as manufacturing firms, over half of a firm's capital expenditure involves information technology. Jonscher (1983) has actually suggested that the appropriate use of IT may be the principal source of future growth for the US economy. However, significant difficulties often plague IT implementation (Tait and Vessey, 1988; Kwon and Zmud, 1987; McFarlan, 1981).

The use of information technology and systems to facilitate communication, exchange of information, and to automate transactions between business partners has been studied for almost twenty years. Initial research papers focused on opportunities

and benefits of implementing IT/IS which links business partners and factors facilitating and inhibiting implementation of electronic links between business partners (for example, Venkatraman, 1991; Holland and Lockett, 1994; Cavaye and Cragg, 1995). However, current interest is focused on the business opportunities provided by Internet and adoption of e-commerce (Cronin, 1994, 1995 and 1996; Ellsworth & Ellsworth, 1994 and 1996; Dahl & Lesnick, 1996; Cockburn, C., and Wilson, T.D., 1996; McKeown and Watson, 1996; Kalakota and Whinston, 1996 and 1997; Vassos, 1996; Collin, 1997; Mougayar, 1997; Nemzow, 1997; Goldsworthy, 1997; Khalil, 1997; Kosiur, 1997; Neuman and Medvinsky, 1997; Ford and Baum, 1997; Gide and Soliman, 1997a and 1997b; McKnight, and Bailey, 1997; Norton, and Smith, 1998).

It is a reality that, today, Internet-based e-commerce applications are in their infancy (Kalakota and Whinston, 1997). Besides, investments in innovative information technology (IT) applications are risky and expensive (Dos Santos, 1991). The managerial decision, to adopt the Internet-based e-commerce system early or wait for the technology to become more established, is not trivial. Early adoption posses significant demand and technological risks, but the rewards could be great. Firms will adopt e-commerce technology as they observe competitors' success in using this channel to attract to customers and generate revenue and profits. Besides, technology vendors such as ClearLogic, CheckFree and Open Market, will derive adoption be persuading potential e-commerce firms to adopt the technology. They may do so by actions that improve security, make customers feel more secure, and by raising expectations that, for example, electronic retailing will soon "be a trillion-dollar industry" (Negropente, 1997).

With the explosive growth in the use of the Internet by consumers and firms, there appears to be a tremendous potential new market, ideally suited to the development of innovative e-commerce applications in nearly all industries. In spite of extremely rapid growth in the number of consumers with access to the Internet, the number of businesses who actually accept electronic transaction over the Internet remains small (Stipe, 1996). Most customers appear to be reluctant to send sensitive personal

information across the Internet and to make legally binding transactions in this environment (Minahan, 1997).

On the other hand, companies both large and small have seen the opportunity to explore how to use it to become more productive and competitive. Media reports have also speculated how the Internet-based e-commerce will allow businesses to access a global-wide customer base of millions. Research shows that, even though there has been numerous success stories about benefits obtained from using the e-commerce, it is not as straight-forward and simple as it is suggested by the IT/IS/e-commerce software solution providers. Because there are also examples of business failures or disappointments obtained from using the e-commerce. Therefore, Internet-based e-commerce requires a more in-depth organisational learning process, knowing the most critical success factors for implementation, organisational effectiveness, and management commitment and support.

Further, with the newer concepts such as the *Intranet* (intra-organisational operations and work-flow process between a company's departments at home and abroad) and *Extranet* (for inter-organisational links with suppliers, business partners and distributors), there are more opportunities to exploit the Internet commerce beyond its existence as a common global network to encompass enterprise-wide networks and inter-organisational systems. Internal and external integration and cross-functional communication are critical links in implementing E-commerce (Mougayar, 1997). The increasing importance of information technology and systems sharing alliances with both competitors and non-competitors is indicative of the boundary spanning, seamless enterprise of the future (Hirschhorn and Gilmore, 1992).

As Internet-based e-commerce gain momentum, there are an increasing number of research efforts focusing on the impact of the Internet on existing business models (Cronin, et al., 1994; Benjamin and Wigand, 1995; Hoffman and Novak, 1996; Quelch and Klein, 1996; Kalakota and Whinston, 1996; Fischer, 1997). But, on the other side, despite the popularity of Internet-based e-commerce, little empirical

research has been done outside of the USA and Western Europe. Unfortunately none-of these are about the critical factors of Internet-based e-commerce implementation at the time this research was conducted.

Past research has often focused on the demographics and growth of the Internet and e-commerce, in terms of number of host sites and users. For example, the Nielson Media Research, (http://nielsonmedia.com/); the Graphics, Visualisation and Usability Center (http://www.cc.gatech.edu/gvu); CyberAtlas (http://www.cyberatlas.com/); have periodically carried out extensive research on the profile of Internet users and the use of the World Wide Web (WWW). Similarly, King (1996) has conducted a census of the number and characteristics of the publicly accessible Web sites of Fortune 500 companies.

Barker (1994) conducted a research on the importance of the Internet for businesses. He concluded that searching for customer information and obtaining specific information for marketing purposes were the most important benefits the Internet offered to small business.

Fuller and Jenkins (1995) reported an experimental study on the learning and business transformation process of small business adoption. They found that the information richness of the environment in which the firms operate, the necessity to collaborate in order to compete, and the business cultures present in communicating electronically all play an important role in ongoing Internet usage. Poon and Swatman (1995) analysed the government policies of countries with well-developed Internet connectivity and found that all were encouraging small businesses to use the Internet to become more effective and efficient in the global competition.

According to Prakash (1996), many factors contributing to the proliferation of e-commerce activity include:

- Rapid expansion of networks on the Internet,
- Improved hardware and software platforms,

- More user-friendly interfaces and functionality,
- Decreasing cost of establishing and maintaining a Web presence,
- Timeliness of online information and the interaction with it.

Prakash (1996) and Ford and Baum (1997) stated that, although the Internet offers significant benefits to the user organisation, it is not without its shortcomings. Security poses a major difficulty. Distributed systems, such as the Internet, increase the vulnerability of commercial environments. He also expressed that, changes in corporate communications and culture was another significant issue organisations face in implementing e-commerce as a medium. The Internet environment alters the protocol for who speaks for the company (Nejmeh, 1994). Managing the communications of personnel also becomes more complex. Leakage of sensitive or proprietary information may inadvertently occur. Although this risk exists regardless of the communications medium used, it is magnified by the global nature of the Internet (Prakash, 1996). With the use of the Internet, the existing communications hierarchies are broken down and the Internet tends to dissolve the segmented walls of knowledge within an organisation (Press, 1994).

On the other hand, Abell and Lim (1996) have carried out a survey study on the use of the Internet by small businesses in New Zealand. Lymer et al. (1996) constructed a business impact model based upon a number of case studies on how the Internet impacts on different aspects of a firm. Sieber (1996a, 1996b) studied how Swiss firms are using the Internet and the issue of 'virtuality' on future organisational forms.

Similarly Soh et al. (1997) conducted a survey study among Singaporean businesses about their perception of using the Internet and identifying the industries in which the Internet is being most used for business. They found that seven major industries lead in the business use of the Internet in Singapore: computer and information technology; hospitality; manufacturing; travel; retail; publication; and banking and finance. They concluded that business usage of the Internet are marketing and advertising, customer service and support, information gathering, and to a lesser

degree, electronic transactions, and the problems encountered by the respondents include difficulty in locating information, rising costs of the Internet use, and security.

Some other research articles have also been investigated as following:

- Evolution and diffusion of the Internet (Goodman et al., 1994; Kahn, 1994; Kline, 1996);
- Commercial (business) uses of the Internet (Hoffman et al., 1995; Scacchi, W., 1995; Cockburn and Wilson, 1996; Spar and Bussgang, 1996; Seng, 1996; Fojt, 1996; May, 1996; Gray, 1996; Senn, 1996; Cooper, 1996; Abell, and Lim, 1996; Hoffman, et al., 1996; Birch, 1997; Keen and Ballance, 1997; Birch and Young, 1997; Feher and Towell, 1997; Fischer, 1997; Copeland and Hwang, 1997);
- The Internet as a strategic tool (Nejmeh, 1994; Seng, 1996; Sola, 1996; Cronin, 1996; Kapur, 1996);
- Use of the Internet for education and research (Ives and Jarvenpaa, 1996);
- Manufacturing (Mathieu and Dickerson, 1995; Upton and McAfee, 1996; Mackay, 1996; Hinkkanen, et al., 1997);
- Marketing (Forcht and Wex, 1996; Quelch and Klein, 1996; Heinen, 1996; Herbig and Hale, 1997; Tjostheim, and Aanonsen, 1997; Aldridge et al., 1997; Adam, and Wesrberg, 1998);
- Human resources management (Grengard, 1996);
- Electronic publishing (Chellappa, et al., 1997; Tham, and Peng, 1997); and
- Obtaining business competitive advantage and intelligence (Cronin, et al., 1994; Graef, 1995; Pawar and Sharda, 1997).

In addition, issues relating to the Internet such as:

- Information and Internet security and privacy (Liddy, 1996; Doddrell, 1995 and 1996; Sanderson and Forcht, 1996; Forcht and Wex, 1996; Friedman, 1996; Bernstein et al., 1996; Ford and Baum, 1997; Goldschlag, et al., 1997; Ahuja, 1997; Neuman and Medvinsky, 1997; Loeb, 1998);

- Intellectual property rights (Small, 1996);
- Data integrity (Mathieu and Woodard, 1996);
- Legal risks (Smith, 1996;);
- Certificates and trust in electronic commerce (Ford and Baum, 1997; Wilson, 1997; Froomkin, 1997);
- Societal-cultural issues (Katz and Aspden, 1997; Ramsoomair, 1997; Spar and Bussgang, 1997).

These are generally exploratory studies, focusing on Internet and e-commerce impact and adoption, technical issues, societal issues, legal issues, and other conventional E-commerce applications, such as business-to-business transactions, and they have not addressed the CSF of Internet-based e-commerce implementation in business operations. Despite the differing topics and approaches, all of those authors have concluded that businesses big and small are increasingly using the Internet-based e-commerce at some level and that this will radically change the way they do business and their operations.

As far as the author is aware, no empirical studies have been done which have examined the critical success factors (CSFs) of the Internet-based e-commerce implementation at the beginning of this research study (1996/97). However, few empirical studies have been directed toward critical success factors (CSFs) involved in traditional IT/IS planning and implementation.

In addition, Lai and Mahapatra (1997), conducted an extensive study to evaluate the status of IT/IS implementation research through a meta-analysis of published MIS research. Their research resulted with 71 articles on IT implementation published during 1976-1995 in top MIS research. Based on their findings, none of the articles were related to CSF studies on Internet-based E-commerce implementation.

Although several authors have published articles dealing with critical success factors (CSFs) or the Internet and e-commerce, none have combined the two. This

study fills that void by combining both critical success factors (CSFs) and Internet-based e-commerce implementation theory and research.

It is also very important to note and the author of this study is well aware that, that Internet-based e-commerce is quite different from the traditional computer applications in that e-commerce is inter-organisational and supports multiple business functions (ie. from human communication to business processes and transactions). This makes it difficult to extend findings from previous studies in IT/IS implementation systems to Internet-based e-commerce because, as mentioned above, literature studies concentrate on internal systems which do not have an inter-organisational focus. For those reasons, since e-commerce is a new and revolutionary kind of IS and an application type of the IT, it means, the literature and publication materials in the IT/IS implementation field is limitedly relevant to this study.

Therefore, the author of this study has taken every necessary step very carefully in order to extract the factors which aggregate, rephrase and adjustments from the IT/IS literature. Then factors - which are suitable for the Internet-based e-commerce implementation - were selected to establish a research model which is useful for CSF of e-commerce implementation. It was also accepted that the IT/IS related literature of CSF studies could be useful with careful adjustment and necessary extensions of this research foundation in order to incorporate into this study for CSF of e-commerce implementation. So, this chapter reviews the related topics in CSF literature - for example, CSF studies on system success, or CSF studies on information centres, as fundamental for IT/IS/e-commerce implementation success.

In order to explore the current and new implementation success factors, and to develop a reliable model of Internet-based e-commerce in business operations, the author first conducted two Focus Group discussions (including a pilot study) with selected corporate executives and managers who have extensive experience in Internet-based e-commerce implementation, and then employed a large questionnaire survey with the firms actively engaged in Internet-based e-commerce.

The conceptual framework of this research includes literature review in ten contexts as follows:

- An overview of studies on the development of, comments related to, and the reliability of CSF.
- Reviews applied CSF empirical studies for measuring performance and system success.
- Outlines CSF studies on information needs for executives.
- Reviews studies on the application of CSF for user involvement and system success.
- Outlines CSF empirical studies that measure the performance of information centres and e-commerce departments.
- Outlines the studies that relate to change management.
- Outlines the studies that relate to integration of e-commerce
- Outlines the studies that relate to Internet e-commerce security and reliability.
- Outlines the studies and literature that relate to IT/IS/e-commerce implementation success.
- Finally, extracts some advice for IT/IS/e-commerce implementation.

The literature reviewed in this study is based on the concept that successfully managed IT/IS/e-commerce implementation depends on IT/IS/e-commerce management and the interactions among IT/IS/e-commerce resources (staff, hardware, and application software) and users. The concept should be relevant, because "*the success of the information system depends on the social structures and interactions that prevail during and after the development process*" (Lyytinen 1987). Further, in order to evaluate the successfulness of IT/IS implementation, the IT/IS components that are critical to performance should be identified, and the measurement of IT/IS effectiveness and performance of these components should be attained (Zahedi 1987).

This study also reviews the literature related to IS/e-commerce executives/managers' perceptions of IS/e-commerce implementation success. Several studies have

examined the relationship between CSF of IT/IS managers and CSF of IT/IS success. They assert that if a section of a proposed system being considered is very important to the manager, this section usually performs better than others. Miller and Doyle (1987) also reported that all the identified performance measures were significantly related to the CSF of IT/IS managers. If this relationship holds true, the IT/IS/E-commerce managers' perceptions of importance could indicate areas critical to information system performance. These above-mentioned concepts dominate the selection of literature to be reviewed.

3.2 CRITICAL SUCCESS FACTOR (CSF) METHOD AND ITS RELIABILITY

3.2.1 Definition of Critical Success Factors (CSFs)

Critical Success Factor (CSF) method is probably the most used and referred to in the literature (Butcher, 1998, p.69). The Critical Success Factor (CSF) term has been originated by Rockart (1979) and has popularised helping executives to identify their information needs. Rockart suggested critical success factors (CSFs), as a new approach to assist managers to identify the important information needs of the top management of an organisation. Rockart's CSF approach was based on that of Daniel (1961), who was apparently the first to discuss the concept of "*success factors*" in management literature (Rockart, 1979).

Rockart (1979) defined critical success factors as "*for any business, the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organisation.*" They are the few key areas where '*things must go right for the business to flourish*'. He added that if the results in these areas are not adequate, the organisation's efforts for the period would be less than desired and as a result, "*the critical success factors are areas of activity that should receive constant and careful attention from management.*" He also argued that managers need appropriate information for their management functions and that performance in each area should be measured continually. It follows that information

should be made available as necessary for managers' performance. Bullen and Rockart later broadened the definition of CSFs and proposed that they be used as an IS management planning tool (Bullen and Rockart, 1981).

CSFs include areas and issues that are critical to both an organisation's current operating activities and future success. The approach uses a series of interviews to obtain the information necessary to determine which factors are critical. Rockart further stated that the CSF approach can be useful at any level of management, as long as it centres on the information needs for management control rather than strategic planning. Several authors (such as, Byers and Blume, 1994; Slevin, Stieman, and Boone, 1991) stated that the CSF methodology has proven beneficial in generating high-level user involvement and support, and has enabled IS analysts to become business partners with the client business.

3.2.2 Qualities and Limitations of the CSF Method

According to Ward and Griffiths (1997, p. 185), CSF is a most effective technique in involving senior management in IS planning, because it is wholly rooted in business issues, and gaining their commitment to proposed IS actions that contribute to achievement in critical areas. CSFs can be used for the purpose of interpreting more clearly the objectives, tactics, and operational activities in terms of the key information needs of the organisation and its managers, as well as the strengths and weaknesses of existing systems.

In another words, CSFs' purpose is to identify the most important ingredients for the IS strategy since they define the most important ingredients of the business' success (Robson, 1997). As O'Brien (1995) points out as a 'realistic view' of CSF analysis, it is the act of deciding what is important that gives this tool its utility. This technique can be used at the macro level to look at the overall industry, the company overall or a particular business unit as shown in Figure 3.1. It can also be used at individual executive level to determine which of those activities that he or she performs are the

most important for overall achievement of success in a particular objective (Ward and Griffiths, 1997).

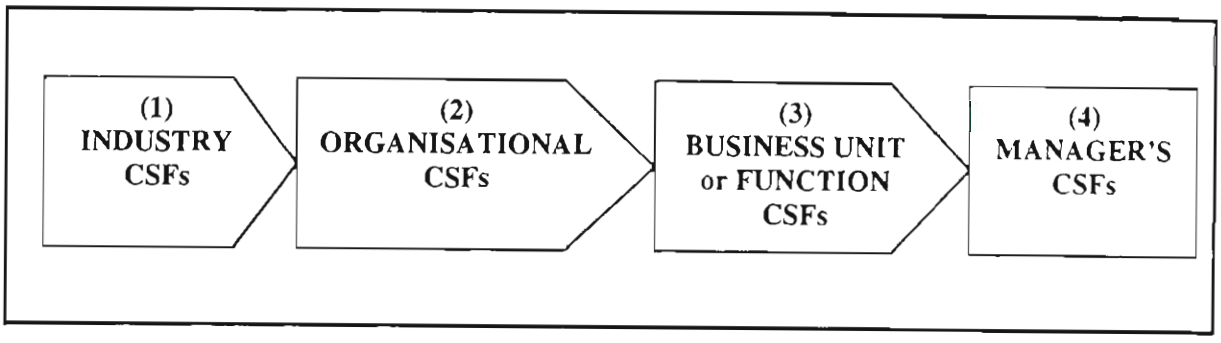

Figure 3.1: CSF Level (After Ward and Griffiths, 1997).

Robson (1997) argue that, prior to use of CSFs, there was a chasm between the consumers of information (ie. user management) and the providers of information services (ie. IS). So CSFs can give some guidance on needs in such a way that the chasm is minimised. CSFs are needs and not development plans or requests for specific systems. CSFs must be:

- Intelligible to senior managers,
- Intelligible to IS managers,
- Possible to act on.

On the other side, Davis (1979, 1980) expressed some potential difficulties and raised several questions about the CSF methodology. He was particularly concerned about the capacity that humans have to construct simplified models that correctly reflect the real-world situations. He criticised the use of CSF because they rely on managers' responses which may be incorrect, incomplete, or insufficient, and caused by the constraints of human behaviour. According to Davis, these constraints are "bounded rationally, human ability to evaluate probabilities and to identify causality, and the biasing effect of availability of data". Thus, in his view, the CSF method will elicit the information that executives feel they need, not the information executives actually need. In other words, managers might unintentionally invent, overlook or fail to mention CSF.

Davis (1980) recommended further research on the use of explicit models and implicit models to elicit information requirements. Davis and Rockart conferred on these issues (1980) and concluded that the researcher working with the executive must be aware of Davis' concerns and work around them. If the researcher understands the business he/she will be in a better position to clarify some of the executive's responses and help solidify the critical factors themselves. Several researchers have responded to Davis' comments and suggested ways to minimise the weakness (Munro 1983; Boynton and Zmud 1984).

Munro and Wheeler (1980) introduced a general approach to identify CSF within the context of corporate planning. They analysed the process of determining information requirements for organisational control purposes by interviewing senior middle level managers in a training seminar. Those processes are: "understand business unit objectives; identify CSF, and identify the performance measures and standards for each CSF; identify data required to measure performance; and identify decisions and information required to implement the plan." From these processes, they concluded that the CSF method and the performance measures and standards for each CSF can help management information systems by providing required management information. In addition to applying CSFs to fabricate a set of strategies, they can also be used to identify critical issues associated with implementing a plan. They also indicated that identifying CSF within the context of organisation planning processes could overcome the potential difficulties noted by Davis.

In response to Davis's comments, Munro (1983) compared the results obtained from Rockart's CSF study (1982) and Martin's CSF study (1982). Munro also examined both authors' articles in detail and compared both articles' citations, descriptions, and their interviews with senior IT/IS managers. He commented that results from these two studies are interrelated and quite similar. He added that the results from CSF methods are reasonable and the CSF approach is a reliable technique. He also mentioned that the CSF approach could not be completely free from the bias of an interviewer's interests and perceptions, unless the interviewers are skilful (Munro 1983).

Anderson (1984) observed that CSFs could be used by managers and organisations to help achieve high performance. Through the explicit identification of organisational CSFs, managers can help ensure that resources under their authority are directed toward important areas. Ferguson and Dickinson (1982) suggested a slightly different role for CSFs: boards of directors can use CSFs to establish guidelines for monitoring a corporation's activities.

According to Laudon and Laudon (1997), the strength of the CSF method is that it produces a smaller data set to analyse than does enterprise analysis. Only top managers are interviewed, and the questions focus on a small number of CSFs rather than a broad inquiry into what information is used or needed.

A unique strength of the CSF method is that it takes into account the changing environment with which organisations and managers must deal. This method explicitly asks managers to look at their environment and consider how their analysis of it shapes their information needs. Therefore, it is especially suitable for top management. Unlike enterprise analysis, the CSF method focuses organisational attention on how information should be handled.

Boynton and Zmud (1984) asserted that the CSF approach is difficult to use and is not appropriate unless the researcher is skillful in the method. They suggested that the researcher could introduce bias during the interview process. They mentioned that any weakness as identified by Davis, which may occur by using the CSF method can be largely overcome by careful application of the technique.

In spite of the potential problems which can arise from this method, they also noted that, with proper training, the CSF approach is practicable and potentially useful in planning and requirements analysis.

Table3.1: The Strengths and Weaknesses of CSFs (After Boynton and Zmud, 1984).

STRENGHTS	WEAKNESSES
1. Provide effective support to planning processes.	1. Farther removed managers are from senior position within organisation, the more difficult it is for them to identify meaningful organisational CSFs.
2. Develop insights into information services that can impact firm's competitive position.	2. Managers not involved with strategic and tactical planing can experience difficulty in dealing with conceptual nature of CSFs.
3. Are received enthusiastically by senior management who identifies with thrust of CSF concept.	3. It is difficult for certain managers to ascertain their information needs using only CSFs.
4. Serve as top level of structured analysis and promote structured analysis process.	

Boynton and Zmud (1984) conducted two case studies; one is a study of a financial services firm and the other a study of a state university. From their experience, guidelines for effective application of CSFs are succeeded:

- CSFs are an excellent tool for information resource planning. The CSF method seems particularly useful for organisations considering a more aggressive information technology posture. CSFs are also very useful in prioritising potential information system projects by identifying those information services that address critical organisational concerns.
- When attempting to translate CSFs into specific information needs for a manager, the use of a prototype is recommended as a means of product development.
- The individual managing the CSF effort should have a through understanding of the organisation or should, at least, be literate in the organisation's principal area of business.
- Because it is desirable to access managers throughout the organisation in some CSF projects, it is useful to identify and cultivate a senior-level manager to champion the project.

Boynton and Zmud (1984) concluded that CSF method has many strengths; the reliability of the CSF method can be achieved in a structured design process; in IT/IS planning, Davis' criticisms can be overcome by interviewing managers across a diagonal slice of an organisation.

This research study employs the idea from Munro, Wheeler, Boynton and Zmud's findings that a CSF approach is a reliable and reasonable technique. Further, a structured questionnaire extracted from literature research might provide a better measure (content and contract validity) as suggested by Churchill (1979). A multi-item measures method could provide a "careful" measure as suggested by Boynton and Zmud. The multi-item measures method could also provide benefits because "the reliability tends to increase and measurement error decreases" (Churchill, 1979). The mail survey would reach IT/IS managers of different levels in an organisation, and thus, could overcome some weaknesses that Davis was concerned about (Boynton and Zmud, 1984; Emory and Cooper, 1991). Moreover, there are several CSF empirical studies using mail surveys - ie. Miller and Doyle (1987); Rivard and Huff (1988); Raghunathan et al. (1989) and Bergeron et al. (1993) - and their results have provided creditable contributions. *The author of this research, therefore, concludes that a mail survey can be a proper method for the CSF study of Internet-based e-commerce implementation success.*

On the other hand, Benbasat (1984) summarised that the CSF approach could be considered in the same classification as information-based on a management-by-objectives approach. He indicated that the critical success factors approach could be a system analysis tool for eliciting executive's information requirements at the management control level. CSF could be a means of supporting system planning and could grant successful competitive performance for the organisation. Since he did not explicitly criticise the CSF method, his support of the CSF approach is warranted.

Further, Zahedi (1987) suggested and developed reliability as the measure of information system success based on CSF. He attempted to provide a theoretical framework for measuring information system success based on CSF. His research used the data of Rockart's 1982 study to identify and build a hierarchical configuration of the observed CSF of the IT/IS. The study also used the data from Martin's 1982 study to verify the construction of the IT/IS configuration that was derived from Rockart's data. Zahedi's verification indicated that the developed CSF configuration could be applied to other sample data with some minor modification.

Based on the derived CSF configuration, Zahedi generated a reliability measure for information systems. This reliability measure is defined as "*the probability that the system works successfully in achieving its objectives under a given set of environmental conditions.*" Zahedi also presented numerical examples and demonstrated how reliability measures can be utilised in evaluating IT/IS projects in cost/benefit analysis. Based on the strengths of the CSF research approach mentioned above and methods for dealing with critical comments, there appears to be some confidence and support for obtaining CSFs for Internet-based e-commerce implementation. During the past decade, more extensive studies have attempted to overcome the weakness attributed to CSF method and have broadened the concept to several different areas. Some of the important applications are shown in Table 3.2.

Table 3.2: Research Studies of the CSF Methodology in Different IT/IS Areas.

Method	Implementation Area	References
CSF	***Internet-based E-Commerce***	***Gide and Soliman, 1998***
CSF	Data management	Guynes, and Vanecek, 1996
CSF	MRP	Ang, Sum, and Chung, 1995
CSF	BPR	Grover et al 1995
CSF	Expert systems	Yoon, Guimaraes, and O'Neal, 1995
CSF	DSS	Palvia, and Chervany, 1995
CSF	Systems development	Byers, and Blume, 1994
CSF	JIT	Mehra, and Inman, 1992
CSF	Management involvement in IT	Yap, et al 1992, and Cragg and King 1993
CSF	IS performance measurement and enhancement	Slevin, Stieman, and Boone, 1991
CSF	Information centres or IT/IS organisations performance	(Wetherbe, and Leitheiser 1985; Magal and Carr 1988; Raghunathan, et al., 1989; Bergeron, Rivard, and DeSerre 1990
CSF	Information satisfaction in the small business environment	Dickinson, Ferguson, and Sircar 1984; DeLone 1988; Montazemi 1988
CSF	Financial services	Miller and Doyle 1987
CSF	IT/IS planning	Shank, Boynton, and Zmud 1985
CSF	Crises communications	Dilenschneider and Hyde 1985
CSF	Management decision process	Rockart and Crescenzi 1984
CSF	Information requirements and corporate planning	Munro and Wheeler 1980; Boynton and Zmud 1984
CSF	Board of directors' strategic guidelines	Ferguson and Dickinson 1982

So, based on these previous studies, this study attempts to provide empirical research results suitable for applying and identifying CSF in an open-system environment like Internet-based e-commerce implementation success.

3.3 INFORMATION SYSTEMS PERFORMANCE AND EFFECTIVENESS FOR E-COMMERCE IMPLEMENTATION SUCCESS

Businesses of all types and sizes have found that the Internet can serve many of their needs, including marketing, customer, and vendor support, exchange of information, and joint ventures for research and development. With the aid of the Internet, companies can also develop new products, take orders, receive electronic publications and documents, and retrieve data from speciality databases. Businesses can find technical advice, build and maintain business relationships, obtain market intelligence, search out good deals, locate people with needed skills, and even provide products directly.

Rapid development of new services means that full E-commerce is quickly coming to the Internet. Order taking, order verification, invoicing, and electronic funds payments are becoming a reality for both large and small businesses. These advantages offer great prospects for breaking the bottleneck that has hindered many companies from moving to EDI. Despite all of those benefits of the Internet and e-commerce, unfortunately, there has not been found any published research on the CSF of Internet-based e-commerce implementation in business operations at the time this research was conducted.

This study therefore, tries to combine previously published IT/IS implementation related research studies with a limited number of e-commerce related publications, in order to incorporate the CSF of Internet-based e-commerce implementation model.

Despite the proliferation of information technology in organisations, the implementation of information systems remains a significant issue (Lucas, Ginzberg, and Schultz, 1990; Mukhopadhyay, Kekre, and Kalathur, 1995). Organisations have come to rely on technological innovations as a central component of their competitive strategy (Reddy, 1990). While new technologies (ie. Internet and e-

commerce) hold tremendous promise for enhancing an organisation's efficiency and effectiveness, much of this potential is never realised (eg. Kwon and Zmud, 1987).

Griffith and Northcraft (1993) have proposed a model of cognitive determinants of technology implementation success. Their model emphasises that differences in cognitions (e.g., thoughts, perceptions, and constructed understandings) among users, designers, and implementers (e.g., Lind and Zmud, 1991) are critical determinants of the implementation success. Prior researchers have provided broader models of implementation (e.g., Cooper and Zmud, 1990); Goodman and Griffith, 1991); the Griffith and Northcraft (1993) model focuses on the problematic human and organisational components of technology implementation success.

Successful implementation of modern technology (like Internet and e-commerce), innovation and management is crucial for enhancing the productivity and competitive position of an organisation. However, the successful implementation of IS in organisations remains a challenge. The problems involved are accentuated by numerous past IS implementation failures (Lucas, 1981; Zmud, 1983).

One study of 2,000 US companies found that 40 percent had not achieved the intended benefits from implementing an office technology (Bikson and Gutek, 1984). Significantly, less than 10 percent of these implementation failures appeared to stem from technical problems; most occurred for human and organisational reasons, such as poor technology management (Bikson and Gutek, 1984), including users' misunderstanding of the meaning and/or uses of the technology (eg., Griffith, 1993). The Internet-based e-commerce is no exception. That is why, identifying CSFs for e-commerce implementation success is become a crucial necessity for organisations in this competitive business environment.

In order to evaluate Internet-based e-commerce's implementation success in business operations, systems performance and effectiveness should be considered and measured. Because no research publications were found on CSF of Internet-based e-commerce implementation, it is justifiable to use IT/IS related literature in this

manner. Researchers have studied different aspects of IT performance and effectiveness, resulting in a large number of ways to measure small facets of effectiveness, but no single comprehensive measure of a CSF model has been developed. The following summarises some of the important studies related to this study:

Increased competitive pressure due to the globalisation and rapid enhancements in enabling technologies demand that organisations adopt and implement new technologies and systems (like Internet and e-commerce) rapidly. Those who fail to meet this challenge may lose an opportunity to enhance productivity and their competitive position, which may even threaten their survival.

Information system *implementation success* can be defined as a decreasing function of the effort (cost) of transforming the designed model of an IS into an effective working system. Correspondingly, IS *adoption success* can be designed as the impact of the information system on the effectiveness of the adoption organisation. IS *implementability* is used to describe the ease of implementation. IS effectiveness is interpreted as the change in organisational effectiveness resulting from the introduction and use of the IS (Iivari and Ervasti, 1994).

The study of implementation of new information technologies and systems (like e-commerce) is an important area of IS management research (Lucas, and Baroudi, 1994). However, reviews of existing implementation literature show that IS implementability is largely a neglected field. There are several explanations for this:

- Implementation is not always recognised as a distinct phase of IS development. Lucas ((1981), for example, defines implementation as "an on-going process which includes the entire development of the system from the original suggestion through to the feasibility study, systems analysis and design, programming, training, conversion, and installation of the system". This naturally obscures the role of implementation as a critical stage in the IS adoption process.

- Most of the existing IS implementation research has involved custom-designed systems (Lucas, Walton, and Ginzberg, 1988). This explains the extension of the IS implementation process to cover the whole IS development process, because in in-house development the analysis and design process is often very critical in terms of resource consumption and risks. It is also crucial from the viewpoint of IS implementability, since the system to be implemented is essentially determined by the analysis and design process. Many central implementation factors, such as user participation, management support, etc., also involve the whole IS development process. The increasing adoption of application package-based information systems can be expected to alter this, since a package reduces the extent of the analysis, technical design, leading directly to implementation after a short analysis of requirements, and a decision on the package to be acquired. This can be expected to lead to a situation in which the problems of IS adoption are encountered in the implementation phase (Iivari, 1987).

- Those who identify implementation as a separate activity tend to view it primarily in terms of acceptance. Lucas et al. (1990), for example, define implementation as a '*change in information processing or decision-making behaviour*' and, noting that this is often difficult to measure, propose acceptance and use as two variables closely related to it. This leads to the basic form of their structural model of IS implementation, in which manager and user acceptance are assumed to be influenced by several variables while user acceptance is taken to influence use, performance, and satisfaction with the system. Their view of the IS implementation process is highly simplified, being implicit in three aspects of the model:

1. Variables such as involvement and knowledge of the system indicate how well the implementation process was handled;
2. They view implementation as a two-stage process that includes a manager model and a user model; and
3. The sequence of relationships among the variables and intermediate outcomes implies a causal process.

Therefore, successful implementation normally requires an effort on the part of the users to learn how to use the system. This can partly be supported by training provided by the implementer. IS implementation (for example, e-commerce) may also include modification to the system.

Moreover, Cameron and Whetten (1983) characterise the assessment of organisational effectiveness through seven critical questions:

- What is the purpose of assessing effectiveness?
- What level of analysis is being used?
- From whose perspective is effectiveness assessed?
- What domain of activity is the assessment focused on?
- What time frame is being employed?
- What types of data are being used in the assessment?
- What is the reference against which effectiveness is being judged?

On the other hand, in their study, Hamilton and Chervany (1981a) determined the need for performance measures for IT/IS. They claimed that "*Evaluating system effectiveness in meaningful terms has been the most difficult aspect of the IT/IS implementation process.*" Hamilton and Chercany (1981b) also described and compared the effects of evaluator viewpoints on system effectiveness on resources-oriented perspective (or efficiency) and influences-oriented perspective (or effectiveness). Some of their evaluation items - for example, IT/IS personnel productivity, computer performance, service, and users' attitude - are identical to the components of CSF from Rockart (1982), Martin (1982), and later CSF studies, briefly reviewed later. Some of Hamilton and Chervany's evaluation items - e.g., productivity, service, and users' attitude - are included in the research instrument.

In addition, Zmud (1979) suggested that organisational factors, IT/IS usage, top management's support, decisions performance, personal and interpersonal characteristics, users' attitude, IT/IS staff characteristics and IT/IS policies influence the success of an information system implementation. Zmud also suggested that

research should examine system usage, user satisfaction, and user performance for IT/IS success.

Further, Ginzberg (1981) attempted to track and manipulate the controllable variables by developing tools for the system designer and users. Ginzberg suggested that there are two management approaches that can increase the effectiveness of the system development process. One approach is to identify those variables that are both especially important to the success of system development and controllable by the user or the system designer. The other approach is to manage the development process of the system designer and user by utilising development tools and procedures. Ginzberg conducted a field study in a large US bank and concluded, "*the degree of realism of user's pre-implementation expectations was positively correlated with a range of project success measures, both attitudinal and behavioural*".

According to Rockart and Flannery's definition of end-users (Rocket and Flannery 1983), an IT/IS manager could serve as a system designer and user as well. Following Ginzberg's suggestion, this study also attempts to examine the e-commerce executive/manager's view of the importance of e-commerce implementation success. As a result, the IS/e-commerce manager has been chosen as the research subject of this study.

A comprehensive list and classification of factors of relevance to IS implementation is given by Lyytinen and Hirschheim (1987) under the heading of 'reasons for IS failure'. These include technical features of the IS itself; features of the IS environment including individual, organisational, and environmental aspects; features of the systems development process such as the methods used or the amount of attention given to decision-making processes; and features of the systems development environment such as the organisational knowledge possessed by system developers or amounts of user education. This list of factors provides a useful classification of much of the IS implementation literature but, as noted by the authors themselves, interactions between the factors are crucial.

Further, Yaverbaum (1988) applied the " *Job Diagnostic Survey*" (developed by Oldham and Hackman in 1980) on 84 end-users to investigate motivation and satisfaction in a computer environment. Yaverbaum's results indicate that task factors, organisational factors (management support, management activity, and training program), and user factors (cognitive differences, users characteristics: attitude, age, past training, education, job experience, and user participation) affecting user satisfaction, are crucial to the success of information systems.

Moreover, Hufnagel (1990), drawing upon attribution theory, examined the effects of performance outcomes on users' judgements about the IS in the experimental use of a computer-based business game. Her findings lead her to conclude that " user satisfaction may be a less than adequate surrogate for system effectiveness" and that the normally assumed direction of causation may be reversed – performance outcomes may lead to feelings of satisfaction or dissatisfaction.

In addition, DeLone and McLean (1992) identified six major dimensions of IS/IT success. These are:

Four dimensions of IS success:

- *system quality* - the measures of IS itself;
- *information quality* - the measures of the IS output;
- *system usage (information use)* - recipient response to the use of the IS output; and
- *user satisfaction* - recipient response to the use of the IS output-

Two dimensions of IT impact:

- *individual impact* - the effect of information on the behaviour of the recipient, and
- *organisational impact* - the effect of information on organisational performance.

Each dimension has been operationalised in a variety of ways. DeLone and McLean also outline a descriptive model of IS success in which system quality and information quality separately and jointly influence both use and user satisfaction. Use and user satisfaction is assumed to be highly interdependent, and they are further assumed to be direct antecedents of individual impact. Individual impact is also assumed to have some organisational impact. In reviewing the 180 empirical studies (articles) during the period 1981-1987, DeLone and McLean (1992) identified 16 different empirical measures of system quality, 18 measures of information quality, 32 measures of system usage, 32 measures of user satisfaction, 47 measures of individual impact, and 25 measures of organisational impact.

DeLone and McLean (1992) also provide a basis for a comprehensive model with their literature review and taxonomy of the various measures of IT implementation success. Their taxonomy includes four traditional dimensions of IS success – *system quality, information quality, system usage, and organisational impact* - and they propose a descriptive model showing the interdependencies among the dimensions of success.

In his survey, Li (1997) used 46 items to identify the most important information success factors in which 39 items were taken from the Bailey and Pearson's (1983) original study. In addition to that, 7 items extracted from other studies. These include: user's attitude toward using computer-based information systems (CBIS), (Benbasat, et al., 1980); the clarity of output information, the instructiveness of output information (DeSanctis and Courtney, 1983); the support of productivity tools (Ives et al., 1983); the overall contribution of CBIS to the organisational goals (Martin, 1984); the efficiency of the systems, and the effectiveness of the systems (Swanson, 1974). Table 3.3 shows the items used in Li's study. Li (1997) also found that the top five important information system success factors indicated by the IS managers are:

1. Accuracy of output,
2. Reliability of output,

3. Relationship between users and the IS staff,
4. User's confidence in the systems,
5. Timeliness of output.

Table 3.3: Dimensions and Factors of Information Systems Success (After Li. 1997).

DESCRIPTION OF FACTORS			
System Quality		***Individual Impact***	
13	Response/turnover time	29	User's expectation of computer-based support
15	Convenience of access	36	Job effects of computer-based support
23	Features of computer language used	31	Perceived utility
25	Realisation of user requirements	***Service Quality***	
26	Correction of errors	7	Technical competence of the CBIS staff
27	Security of data and models	8	Attitude of the CBIS staff
28	Documentation of systems and procedures	9	Scheduling of CBIS products and services
38	Flexibility of the systems	10	Time required for systems development
39	Integration of the systems	11	Processing of requests for system changes
Information Quality		12	Vendor's maintenance support
16	Accuracy of output	14	Means of input/output with CBIS centre
17	Timeliness of output	30	User's understanding of the systems
18	Precision of output	35	Training provided to users
19	Reliability of output		***Conflict Resolution***
20	Currency of output	2	Competition between CBIS and non-CBIS units
21	Completeness of output	3	Allocation priorities for CBIS resources
22	Format of output	5	Relationship between users and the CBIS staff
41	Clarity of output	6	Communications between users and the CBIS staff
42	Instructiveness of output	34	Personal control over the CBIS
Information Use		37	Organisational position of the CBIS unit
24	Volume of output	40	User's attitude toward using the CBIS capability
User Satisfaction			***Organisational Impact***
1	Top management involvement	44	Productivity improved by the CBIS
4	Charge-back method of payment for services	45	Efficiency of the system
32	User's confidence in the system	46	Effectiveness of the system
33	User's participation		
43	Support of productivity tools		

Brockway and Hurley, (1998) identified factors of IT performance, which incorporate both user views and internal efficiency measures:

- User satisfaction;
- User expertise;
- Quality of systems development;
- Data centre performance;
- Network performance; and
- Distributed computing performance.

Based on their experience at IBM, Grohowski, R., McGoff, C., and Vogel,D., (1990) have identified 13 critical success factors that they consider relevant to effective Electronic Meeting Systems (EMS) implementation: Organisational commitment; Executive sponsor; Operating sponsor; Dedicated facilities; Reciprocal site visits; Communications and liaison; Fast iteration of software changes; Training; Transfer of control; Cost/benefit evaluation; Software usage flexibility; Facilitation support; Managing expectations.

According to Cronin (1994) the following benefits may accrue from the commercial use of the Internet (e-commerce):

- Global communications,
- Corporate logistics,
- Competitive advantage,
- Information resources,
- Customer feedback and support,
- Marketing,
- Collaboration and development,
- Vendor support and networking.

According to a snapshot survey, "ITAA IndustryPulse Survey (1997)," conducted by the ITAA (Information Technology Association of America) in conjunction with

Ernst & Young, among the top benefits that the survey respondents' customers cite for moving to Internet-based e-commerce are decreased overhead costs from interfacing to back-end functions (61%).

This response indicates that businesses expect to gain the most advantage by streamlining their processes rather than by simply increasing sales by adding the Internet as a new channel.

On the other hand, Iacovou et al. (1995) and Poon and Swatman (1995) stated that the most likely performance factors for using the Internet e-commerce as follows:

1. Reduced transaction costs,
2. Better customer service,
3. More efficient information access,
4. Global communications, and
5. Shortened communication cycles.

According to Teo, and King (1996), information systems contributions to organisational performance are:

- Increased ROI,
- Increased market share of products and services,
- Improved internal efficiency of operations,
- Increased annual sales revenue,
- Increased customer satisfaction.

Laudon and Laudon (1997) explain the possible cost and benefits of a new information systems implementation (ie. Internet-based e-commerce) in a table as shown below.

Table 3.4: Costs and Benefits of a New Information System (After Laudon and Laudon, 1997)

BENEFITS		COSTS
TANGIBLE (cost saving)	**INTANGIBLE**	
Increased productivity	Improved asset utilisation	Hardware
Low operational costs	Improved resource control	Telecommunications
Reduced work force	Improved organisational planning	Software
Lower computer expenses	Improved organisational flexibility	Services
Lower outside vendor costs	More timely information	Personnel
Lower clerical and professional costs	More information	
Reduced rate of growth in expenses	Increased organisational learning	
Reduced facility costs	Legal requirements attained	
	Enhanced employee goodwill	
	Increased job satisfaction	
	Improved decision making	
	Improved operations	
	Higher client satisfaction	
	Better corporate image	

As a summary the potential benefits of Internet-based e-commerce system are:

- Significant gain in speed of communications, especially for international communications.
- Improved efficiency, eg. data need not be re-keyed enabling manpower to be more productively deployed; re-keying errors can be eliminated; purchasing and production cycles can be drastically reduced.
- Potential cost savings, eg. e-mail saves on post and messages; EDI can mean big reductions in inventory and in costs related to the purchasing cycle.
- Closer relations with customers and suppliers, eg. Web sites enable a company to keep customers and suppliers up-to-date easily; EDI means companies work more closely together.
- Quick and easy way of providing information on a company and its products, internally and externally, eg. WWW sites, Intranets, and Extranets.
- Alternative sales channel, eg. doing business through a Web site.

This study indicates that the success factors of conventional IT published in the literature, are also relevant to Internet use, in particular the perceived benefits and management commitment. In addition, factors such as the presence of systems analysts and the number of administrative applications appear to be less important than the attitude of staff and management.

This study adopts most of these variables [with necessary adjustments to make them suitable for an open-system environment (ie. Internet and e-commerce) in accordance with the literature and the two Focus-Group discussion results] in the research instrument for identifying CSF of Internet-based e-commerce implementation success. Appendix-A and Table 5.2 in Chapter 5 provides the cross-reference of this literature and the research instrument.

3.4 INFORMATION REQUIREMENTS FOR E-COMMERCE IMPLEMENTATION SUCCESS

Information requirements drive the entire system-building effort. Users must have sufficient control over the process to ensure that the system reflects their business priorities and information needs, not the bias of the technical staff. Working on design increases users' understanding and acceptance of the system, reducing problems caused by power transfers, intergroup conflict, and unfamiliarity with new system functions and procedures (Laudon, and Laudon, 1997).

LaPlante (1994) suggested that the critical success factors of IT/IS within an organisation is the understanding between business and information management areas of organisations as to what the business benefits of new technology actually are. LaPlante (1994) pointed to the need of chief executive officers (CEOs) to define IT/IS in terms of how effectively it, technology, meets business goals and not merely operational efficiency.

Rockart's 1982 classic study identified the CSF from nine IS executives. These CSF differ from company to company, but can be summarised as a set of four generic CSF:

- Service (operations and development),
- Communication between users and IT/IS staff,
- IT/IS human resources, and
- Re-positioning the IT/IS function.

Rockart also explained that the fourth generic CSF, re-positioning the IT/IS function, contains four basic elements: "*technical, organisational, psychological, and IT/IS managerial* ". From these four generic CSFs, Rockart discussed the related items as the key ingredients for success. These items are confirmed and supported by similar items examined in later studies by Martin (1982), and Magal and Carr (1988). Therefore, Rockart's four generic CSFs are included in the research instrument of this study.

Martin's study (1982) obtained the results from interviewing 15 chief IT/IS executives of sizeable business or governmental organisations. He identified seven general CSFs of IS organisations:

- System development,
- Data processing operations,
- Human resources development,
- Management control of the IT/IS organisation,
- Relationships with the management of the parent organisation,
- Support of the objectives and priorities of the parent organisation,
- Management of change.

As mentioned above, Munro (1983) compared Rockart's and Martin's studies and concluded that their results correspond closely to each other. Munro's discussion

further confirms Rockart's and Martin's studies. Accordingly, these seven CSFs are also of high priority for this research.

In addition to that, Ferguson and Dickinson (1982) suggested that CSFs have particular significance for boards of directors. They claimed that by identifying and monitoring CSFs through its own analysis, the board could direct the activities of the chief executive officers. *They suggested seven CSFs for directors:*

- The need to improve productivity,
- The need to make better use of resources,
- The need to improve the product or the product line,
- The need to strengthen and develop management,
- The need to be more attractive to lenders and inventors,
- The need to increase the value added,
- The need to become less vulnerable to inflation.

This study adopts most of these variables [with necessary adjustments to make them suitable for an open-system environment (ie. Internet and e-commerce) in accordance with the literature and the two Focus-Group discussion results] in the research instrument for identifying CSF of Internet-based e-commerce implementation success. Appendix-A and Table 5.2 in Chapter 5 provides the cross-reference of this literature and the research instrument.

3.5 USER INVOLVEMENT FOR E-COMMERCE IMPLEMENTATION SUCCESS

Research studies indicate that the end user has become crucial to the success or failure of an IT/IS system implementation. User involvement was defined by Franz and Robey (1987) as the amount of user's perceived influence during the design and implementation stage. The activities in the process of involvement should include specifying and clarifying needs, stating input and output requirements, asking

questions and providing answers, and suggesting system needs and objectives. These activities should improve the quality of an IS.

Ives and Olson (1984) reviewed 22 studies and reported that eight studies found a positive relationship between user involvement and implementation success; seven studies produced mixed results. They concluded that further research should be based on a strong conceptual foundation built on the knowledge from previous research. From Ives and Olson's findings, this study is based on the assumption that there is a positive relationship between user involvement and Internet-based e-commerce implementation success, and this proposition is thoroughly examined in this study.

Laudon and Laudon (1997) stated that, the level of user involvement should vary depending upon both the development methodology being used and the risk level of the projects. Tools to involve users - external integration tools – consist of ways to link the work of the implementation team to users at all organisational levels. For example users can be made active members or leaders of systems development project teams or placed in charge of system training and installation.

Turban, McLean and Wetherbe (1996) indicated that direct and indirect users of a system are likely to be the most knowledgeable individuals concerning requirements and which alternatives will be most effective. Users are also the most affected by a new information system like e-commerce. Information systems analysts and designers, on the other hand, are likely to be the most knowledgeable individuals concerning technical and data managerial issues as well as the most experienced in arriving at viable systems solutions. The right mixture of user involvement and information systems expertise is crucial (Turban, McLean and Wetherbe, 1996).

Rivard and Huff (1984) studied ten of the 100 largest Canadian business firms having more than two to three years' experience with services promoted to assist user-developed applications (UDA). Their research utilised two sources: one, in-depth interviews with data processing (DP) executives and other DP professionals responsible for providing end-user support services; and two, the secondary data

from an IS profile questionnaire, internal documents and direct observation. Their findings suggested that users are satisfied with the UDA services made available to them via IS departments. They also concluded that the evaluation of tangible benefits associated with the UDA services is a critical issue for IT/IS managers. As a result, this study is based on the assumption that services supported by the IT/IS/e-commerce department increase users' facilitation and thus increase Internet-based e-commerce implementation success.

Further, Rivard and Huff (1988) in a follow-up study reported critical success factors for end-user computing via a two-phase study based on their 1984 study. Of 1,074 subjects surveyed, 272 end-users answered the questionnaire, giving a 25 percent response rate. The following factors of success were found: quality of IT/IS support, user satisfaction with support from IT/IS, user satisfaction with environmental set up, perception of user-friendliness of software tools, and user's attitudes. Each of these factors is positively correlated with end-user computing success.

In addition to that, Tait and Vessey (1988) conducted a survey-based field study (questionnaire-based) of thirty Australian firms that implemented custom-built information systems. In all, they surveyed 59 systems and obtained complete responses for 42 systems, a response rate of 71 percent. They examined the role of user involvement in system design as well as factors effecting the application of user involvement on system development success. They concluded that the availability of adequate resources for system development is an important factor for the success of system development; the association between users' attitudes and system success is small and positive; and system complexity has a negative effect on system success.

On the other hand, Bergeron, Rivard and Raymond (1993) reviewed 67 studies and judged 30 questionnaire items from these articles in order to find potential factors for end-user computing (EUC) success. Then they sent 1,830 questionnaires both to the IT/IS managers and to their immediate superiors of 180 Canadian organisations. A return of 263 questionnaire represents a response rate of 14.3% for individuals and 19.7% for organisations. Through a principal components factor analysis with

varimax rotation, the 30 success variables that were investigated can be merged into five factors. Overall factor loading ranged from 0.42 to 0.73. Cronbach's alpha (α) for each factor ranged from 0.50 to 0.79. Percent of variance explained ranged from 5.0 percent to 23.4 percent. According to Bergeron et al. (1993), these five success factors, listed in the order of decreasing importance, are:

- Organisational effectiveness, regrouping criteria related to improvements in decision making and overall performance in the enterprise;

- User appreciation, which focuses on improvements in the access to and use of information by individuals;

- Efficiency of applications, with criteria relating to improved productivity, cost and time savings brought about by end-user applications;

- Quality of applications, which reflects technical design criteria for databases, outputs and processing of end-user applications;

- Adequacy of applications, which reflects the conflict between individual aims in terms of user or departmental autonomy, and organisational concerns in terms of the relevance and competitive implications of end-user computing for the enterprise. Table 3.5 below lists the items in the research instrument of Bergeron et al. (1993).

The order is rearranged according to the order of importance of the resulting analysed factor. The researchers concluded that this certain order remained the same no matter which stage of end-user computing (EUC) growth obtained. They also judged three composite factors: organisational effectiveness, quality of applications and efficiency of applications as more important within the organisation.

Table 3.5: Items from an Instrument Used to Measure Success Criteria (After Bergeron, Rivard, and Raymond, 1993).

CONTEXT	ITEMS
Organisational Effectiveness	Increase in the quality of decision-making
	Improvement in the decision-making quality
	Improvement in organisational performance
	Improvement in organisational effectiveness
	Attainment of organisational objectives
User Appreciation	Quicker access to information
	Easier access to information
	User satisfaction
	Increase in the quality of information
	Increase in the use of existing information systems
	Better communication capacity
	Increase in data processing capacity
	Efficient use of tools by the users
Quality of Application	No data redundancy
	No duplication of applications
	Quality of information
	Quality of user database
	Error free applications
Efficiency of Application	More work accomplishment by users
	Time savings
	Reduction in users' work effort
	Cost-benefits of applications
	Low cost applications
	Cost-effectiveness of EUC as compared to other possibilities
	Savings in the development of applications by users
	Effective execution of tasks
Adequacy of Applications	User autonomy
	Balance between local autonomy of applications and their integration to organisational systems
	Competitive advantage
	Information systems applied to major organisational problems

This study adopts most of these variables [with necessary adjustments to make them suitable for an open-system environment (ie. Internet and e-commerce) in accordance with the literature and the two Focus-Group discussion results] in the research instrument for identifying CSF of Internet-based e-commerce implementation success. Appendix-A and Table 5.2 of Chapter 5 provides a cross-reference of the literature and research instrument.

3.6 PERFORMANCE OF IT/IS/E-COMMERCE DEPARTMENTS

Magal and Carr (1988) investigated the existence and nature of CSF for an information centre and examined the effects of age, size and hardware options on the CSF applicable to information centres. Twenty-six CSFs were identified from three studies, "Wetherbe and Leitheiser (1985), Summer (1985), and Brancheau, Vogel and Wetherbe (1985)." The questionnaire was sent to 1,450 information centre managers who were randomly selected from the subscription list of Information Center magazine. From the collected data, the three most important variables were determined as follows:

- Competent staff,
- Communication with the users, and
- Top management support.

Five composite CSFs were identified from a principal components factor analysis. The relative importance of the five composite CSFs was found to be the same regardless of the age of an information centre, its size, or the hardware options it supported. These five CSFs are:

- Commitment to the information centre concept,
- Quality of information centre support services,
- Facilitation of end-user computing,
- Role clarity, and
- Coordination of end-user computing.

Gremillion (1982) has identified four factors that contribute to the IT implementation success. These are:

- Management commitment,
- User's task familiarity,
- Capable process leadership in the use of the system, and

- User's computer knowledge.

Ein-Dor and Segev (1988) have investigated the effect of four organisational factors based on a survey of 21 organisations. They have asserted that the extent of IT implementation is closely related to top management use, users' perceived needs, organisation size, and IT budget.

Raymond (1985) has reported that the success of integrating IT in the context of small business is associated with a number of variables: in-house applications development, in-house application use, number of administrative applications, type of applications, and rank of computer-based information system function.

DeLone (1988) has presented a list of nine IT implementation success variables:

- The use of external programming support,
- Level of computer-based information systems planning,
- Top management IT knowledge,
- Top management involvement in computerisation of applications,
- Employees' acceptance of IT,
- The sophistication of IT control,
- The age of IT operations in the organisation,
- The level of IT training, and
- The type of computer use (on-site computer use or vs. use of computer service).

Montazami (1988) has stated that IT implementation is closely associated with:

- the number of system analysts in the organisation,
- the intensity of information requirements analysis,
- the degree of user involvement,
- the level of user computer literacy, and
- the degree of centralisation in the organisation.

Abdul-Gader (1990) has proposed empirical evidence on the critical role of a number of individual and organisational variables in determining the success or failure of IT implementations. IT applications are more likely succeed in organisations with the following profile:

- Large size and adequate organisational resources,
- Extensive user training program,
- Adequate user and management computer knowledge,
- Top management involvement in IT implementation system,
- Availability of skilled IT/IS manpower.

After surveying a number of US organisations, King, et al. (1989) have suggested that the following factors may inhibit effective utilisation on information resources:

- Lack of appropriate planning,
- Lack of appropriate technical support,
- Budgetary constraints,
- Difficulty in assessing tangible IT contribution,
- Complexity of IT concepts,
- High potential start-up (using IT or sub-systems) difficulties,
- Lack of organisational / top management support,
- Power conflict and politics within the organisation,
- Restraining external environment,
- Lack of IT experience in the organisation.

The research instrument for this study of Internet-based e-commerce implementation success includes a modified version of these variables. This study is based on the assumption that an Internet/e-commerce department's support has a positive relationship with e-commerce implementation success. Therefore, this study adopts the CSF studies of Magal and Carr (1988) to examine the relationship of e-commerce department's support and e-commerce implementation success.

Further, in another study, Magal, Carr, and Watson (1988) proposed a stage theory for the evolution of information centres (IC). They sent questionnaires to 1,490 randomly selected subscribers to Information Center magazine. They proposed a stage hypothesis for an information centre and examined 26 relevant CSFs. (The four stages for information centres are initiation, expansion, formalisation, and maturity). Table 3.6 lists these 26 CSFs. From the 311 useable responses, a response rate of 21 percent, they found that their proposition was supported from their survey; the stages of information centre growth had statistically significant impact on the composite CSF. They also found the importance of these composite CSFs tended to change among themselves but was relatively constant individually across the information centre stages. They suggested that it is important for information centre managers to understand the CSF at various stages.

Table 3.6: CSF Variables for Information Centres (After Magal, Carr, and Watson, 1988).

CSFs	VARIABLES
1	Control procedures to ensure standards, policies, etc. are adhered to.
2	A competent staff
3	Support software packages
4	End-user training
5	Monitor and coordinate end-user applications development
6	Top management support
7	Response to applications requests
8	Promote information centre services
9	Communication with users
10	Cost effective solutions
11	Atmosphere for users
12	System performance
13	Understanding of users' business and problems
14	Organisational acceptance of IC concept
15	Manage end-user expectations
16	Provide services to distributed sites
17	Define information centre mission
18	Users' understanding of data processing
19	Reliability of applications developed
20	Commitment of end users to the IC concept
21	Career paths for information centre staff
22	Priority criteria for work
23	Charge back criterion
24	Standardised hardware and software
25	Training for information centre staff
26	Liaison function with end-user departments

Magal et al. (1988) utilised a principal components factor analysis for the 26 individual CSF with varimax (orthogonal) rotation. Their study identified five composite CSF:

- Commitment to the information centre concept;
- Quality of information centre's support services;
- Facilitation of end-user computing;
- Role clarity;
- Coordination of end-user computing.

In addition, Miller and Doyle (1987) investigated 21 South African financial service companies for measuring the effectiveness of computer-based information systems implementation. They sent out an 80-item questionnaire to manager users and DP managers in these 21 companies. From 276 responses, a principal components factor analysis using varimax rotation was applied. The reliability coefficient of the overall instrument was 0.88. The outcome of the factor analysis supported the construct validity of their instrument. The factor loading for each variable ranged from 0.80 to 0.46. Total variance accounted for 62% of the factors in the performance set, and for 55% of the factors in the importance set. From the results of factor analysis, seven composite factors were found:

- Characteristics of conventional systems;
- Strategic management issues;
- User involvement;
- Responsiveness to new systems needs;
- End-user computing;
- IS staff quality; and
- Reliability of service.

The researchers indicated that factors related to IS effectiveness can be mapped well onto the four CSFs determined by Rockart (1982). They also suggested that IS effectiveness is a function of the relationship between perceived importance and

performance on particular information systems attributes. Therefore, if IT/IS managers administer the IS function according to the CSF, they should be able to improve IS performance and effectiveness; that is the implicit finding from Miller and Doyle.

On the other hand, Raghunathan, Gupta, and Sundararaghavan (1989) conducted a survey from a sample of randomly selected 1,000 IS executives from "The facts on the file: Directory of Major Public Corporations" by Stanley Greenfield, which contains various US organisations' addresses. From 205 responses of 1,000 surveyed, or a 20.5% response rate, 199 of the responses were useable. Cronbach's alpha of each CSF, which was above 0.64, supported the reliability of the CSF. Their six CSFs were:

- Human resource development;
- Relationship with, and support of, the objectives of the parent organisation;
- Management control of the IT/IS/DP organisation;
- Data processing operations;
- Performance; and
- System development.

Because the findings of their study indicated the four Rockart's CSFs (operations and development; communications between users and IS staff; human resources and re-positioning the IS function) as well as the six CSFs from Martin's study (data processing operations, system development, human resources, relationships with the management of the parent organisation, support of the objectives of the parent organisations, and management control of the IS organisation), some of their measurement items were included in the research instrument of this study.

Their main purpose was to relate CSF of IS managers to the performance of IT/IS organisations. They concluded that all the performance measures identified in their study were significantly related to the CSF of IS managers. "*Relations with and support of the objectives of the parent organisation is most significantly related to*

performance, whereas a DP operation is least significantly related to performance. ... Improved user job performance is most significantly related to CSF, whereas widespread use of IS is least related to CSF" (Raghunathan et al. 1989).

According to McLeod and Smith (1996), there are three main reasons why any IT systems fail:

- a poor quality system,
- a lack of commitment to implement the system from user management, and
- resistance from the end user.

The most serious implementation problem is resistance to change. This resistance, which is quite natural, can lead to poor use of the new system or even total rejection. Resistance can be reduced by encouraging maximum project participation by as many users as possible and designing a user-friendly interface (ie. Web) to the system.

To help minimise resistance to change a few useful approaches would be used. For example, Lewin-Schein proposes a three-phase approach. Firstly, to unfreeze people (get them involved and used to the idea that changes are coming so that they understand the implications), followed by making the change (implementing the new system) and finally re-freezing (giving support and assistance with the new environment). Clearly management must provide the time and resources for adequate training.

This study adopts most of these variables [with necessary adjustments to make them suitable for an open-system environment (ie. Internet and e-commerce) in accordance with the literature and the two Focus-Group discussion results] in the research instrument for identifying CSF of Internet-based e-commerce implementation success. Appendix-A and Table 5.2 in Chapter 5 provides the cross-reference of this literature and the research instrument.

3.7 CHANGE MANAGEMENT FOR IS/E-COMMERCE IMPLEMENTATION SUCCESS

Despite the tremendous growth in the number of companies opening online store-fronts in the last two years, commercial success on the Internet has been limited (White and Manning, 1998). It has been reported that about one third of the Internet-based e-commerce system projects fail or do not generate returns on investment in the short and middle run. Key factors for this limitation that e-commerce faces are:

- Lack of sustained management commitment, support and leadership;
- Lack of e-commerce skilled manager and staff;
- Unrealistic scope and expectations; and
- Resistance to change.

According to Laudon and Laudon (1997), to gain the full benefit of any new technology (ie Internet-based e-commerce), organisations must carefully plan for, and manage, the change. As the implementation of e-commerce essentially involves change (intra and inter organisational) attention must be paid to the organisational as well as technical infrastructure. Change management literature illustrates that past attempts to change are important to consider when planning new changes. Historical successes and failures can have positive and negative effects, and intrinsically have an impact on the culture within an organisation or industry.

According to Burnes (1996) and Dawson (1996), if the proposed changes contradict the existing culture, implementation is considerably difficult. On the other hand, changes in the way information is defined, accessed, and used to manage the resources of the organisation often lead to new distributions of authority and power (Lucas, 1975). This internal organisational change breeds resistance and opposition and can lead to the demise of an otherwise good system. Therefore, both organisational and technical infrastructure must be taken into account when considering implementation of an e-commerce system.

In the context of change management, *implementation* refers to all of the organisational activities working toward the adoption, management, and routinisation of an innovation such as a new information system (Laudon and Laudon, 1997). Whether system implementations are successful or not depend largely on managerial and organisational factors. The role of users, the degree of management support, the manner in which the systems project handles complexity and risk, and management of the implementation process itself all have a profound impact on the outcome.

According to Armenakis et al., (1994), readiness for change, the cognitive comprising beliefs, attitudes and intentions toward a change effort, is achieved when target group members:

- Realise that there is a better way of behaving,
- Desire to behave in this new way, and
- Feel capable of performing this better way.

Most re-organisations involve dramatic and fundamental change. The buildings and many of people still around and the firm continues to make widgets, restructuring, however, signals a fundamental change in culture and strategy that sends shock waves throughout the organisation (Elliot, 1990).

Internet-based e-commerce is an intensified version of the re-organisation and re-structuring most organisations have to expect. Change must be managed to be successful. Too much too soon, uncontrolled change will inevitable wreck the organisation it seeks to rescue. The organisation must begin by planning for a change, then conducting the restructuring desires, managing the total change process, and finally, managing the new organisation (Whitman, et al., 1996). A very large percentage of information systems fail to deliver benefits or solve the problems for which they were intended because the process of organisational change associated with system-building was not properly addressed. Successful system building requires careful planning and change management (Laudon and Laudon, 1997).

Business processes need to be re-engineered to insure that the organisation fully benefits from the new system or technology. The company's information architecture must be re-drawn to shape the new client/server environment. Management should address the organisational issues that arise from shifts in staffing, function, power, and organisational culture. Communication and education are keys to change management. The better by the employees to be effected by the change, the less resistant to the change they will be. The better trained and prepared for the change, the higher their readiness, and the greater their resilience. Therefore, data models must be developed, training is given, network support assigned, and network management tools acquired.

The major deterrents to successful IS implementation include both technical and organisational issues. However, it is widely recognised that the more serious dimension of this problem is essentially behaviour in nature. This is because the introduction of any IS causes a change in the organisation; ie. to individuals, responsibilities, socio-political structure, etc. Internet-based e-commerce is not an exception.

In addition there is some evidence that technology, in its broadest sense, has a significant effect on the structure of the organisation. Developments in technology may cause some jobs to disappear, for example traditional newspaper typesetters, but it can also open up new business opportunities which make jobs, for example the growth in electronic banking and insurance which rely heavily on advanced computing and communication facilities. Some of the more important elements outlined are developed below.

- **Technology and operational changes:** The use of appropriate Internet technology in properly planned systems can have dramatic effects on business operations. There are numerous examples: travel and holiday agents are all linked by networks directly to the databases maintained by airlines, railways, and holiday companies making possible virtually instantaneous bookings; computing cash tills and bar-code readers in supermarkets are linked to computers and form

part of an integrated stock control, ordering and sales analysis system without which modern supermarkets could not function. Internet technology can also influence the way organisations interact with customers, suppliers and competitors. Sometimes, because of the investment required and mutual benefit competitors collaborate over technology. Sometimes suppliers supply free hardware and software to customers in order to make switching more difficult and costly. Pharmaceutical companies, airlines, and holiday providers frequently do this. The increased use of JIT systems in manufacturing means that much closer liaison is required between suppliers of components and final assemblers. As a consequence, stock control and ordering systems are frequently shared increasing efficiency. The close linkage means that a major assembler of, ie. cars or domestic appliances, can exert considerable influence on their suppliers.

- **Technology and the organisational structure:** Research over many years has confirmed the influence of technology on organisational structures and the way they operate. Internet technology is also having effects on organisational structures. Because of the easier and speedier communications and the increasing sophistication of automatic decision making by computers, middle management is tending to disappear in many organisations. Examples include, computerised stock and production control in manufacturing, automatic credit scoring and loan authorisations in banks.

- **Technology and job changes:** Technology simplifies and reduces tasks needing manual skills and strength especially in factories and all forms of production. The use of technology requires more problem-solving skills and ability to interpret data, and is thus likely to lead a widening gulf between skilled and unskilled workers. Computers and communication equipment have made it possible to combine jobs, which were previously carried out separately. In the process it has also enabled the tasks to be carried out by lower-level staff – known as empowering.

The implementation process demands organisational change. Incorporating e-commerce into business will require some changes. Managing change is very important because almost anything a business does to benefit from e-commerce is going to involve some type of alteration as shown in Figure 3.2 below.

The change might be something as simple as improving a process by doing it electronically instead of manually. But embracing the virtual value chain as a way of doing things, or extracting maximum value from the marketplace, requires more - usually a transformation of a business, or its redefinition (Kosiur, 1997).

Improve the organisation	**Transform the organisation**	**Redefine the organisation**
Product promotions	Customer relations	New products
New sales channels	Organisational learning	New business models
Direct savings	Information sharing	
Time-to-market		
Customer service		
Brand image		

Figure 3.2: Changing Business for E-Commerce (After Kosiur, 1997).

High-tech access to information translates into important new marketing opportunities. Information technology can allow firms to thoroughly and rapidly analyse huge amounts of data about current and prospective customers and their behaviour trends. The most important thing is to look at the overall role of information systems in the workplace, and the organisational changes that result. For instance, when everyone in a firm has a PC and an Internet hook-up, there is the potential for immediate access to the corporate database, to every co-worker and to associates around the world and make information technology one of their primary considerations in analysing business problems and setting goals. The important thing is to understand about the business opportunities that Internet technology represents.

IS implementation (ie. Internet-based e-commerce) have attained a level of complexity that can transcend departmental boundaries, allow the communication of geographically dispersed individuals, change roles and responsibilities and even shift the power structure. Technologies and concepts such as communications, ISDN (Integrated Services Digital Networks), distributed databases, etc. have made such complicated IS applications a reality.

Leavit and Whisler (1985) have stated information technology would alter the shape of organisations and the nature of jobs; information systems have indeed had an impact on the organisations (Szlichinski, 1983). Indeed, the introduction of the IS can cause changes in various facets of the organisation: its business, its process, its culture, and possibly even its mission. If such changes are considered negative by organisational members, then there is likely to be resistance. This can have ramifications both on the success of the particular IS and also on the ability of the organisation to deal with IS related change. On the other hand, resistance tends to be more of a hygiene factor only serving to undermine effective change actions.

Zander (1962) examined the issue of resistance to change and proposed six conditions which are conducive to resistance. These are presented in Table 3.7.

Table 3.7: Conditions Conducive to Resistance (After Zander, 1962).

	Resistance may/can be expected if
1.	Change ignores the already established institutions in the group.
2.	Change is made on personnel grounds rather than impersonal requirements.
3.	To the degree that the persons influenced by the change have pressure put upon them to make it, and will be decreased to the degree that these same persons are able to have some "say' in the nature or direction of the change.
4.	When those influenced are caught in a jam between strong forces pushing them to make the change and strong forces deterring them against making the change.
5.	Different people will see different meaning in the proposed change... some workers saw the change in terms of their personal work performance, some in terms of lost positions, and some in terms of lost power.
6.	The nature of the change is not made clear to the people who are going to be influenced by the change.

Zander (1962) stated "resistance will be prevented to the degree that the changer helps the changes to develop their own understanding of the need for the change, and an explicit awareness of how they feel about it, and what can be done about those feelings." The key to acceptance and adoption of change is personal investment and ownership. By involving the end users of the process, the implementation team can generate a sense of ownership in the new system in those affected by the change, thus improving the probability of successful acceptance.

Turban, McLean and Wetherbe (1996) propose a guideline for minimising the reactions to the change in Table 3.8 below. Turban et al., argue that a foremost guideline for overcoming all dysfunctional behaviour toward new information systems is to obtain top management involvement and support – but getting top management involved can be difficult. Top-level managers are much more comfortable with things they understand. Systems analysts must carefully describe in non-technical terms when communicating with top management and soliciting their support. Additionally, analysts should stress that information systems projects are consistently more successful from an operational, economical, and technical perspective when top management is involved and support them.

Table 3.8: General Guidelines to Minimise Dysfunctional Reactions (After Turban, McLean and Wetherbe, 1996)

STEP	ACTION
1	Identify problems or opportunities that the organisation recognises.
2	Build a good system development cross-functional team with good leadership.
3	Defer changing a business process until it is fully understood.
4	Allow an organisation to learn what it really thorough prototyping.
5	Test and validate systems thoroughly prior to implementation.
6	Develop a realistic implementation schedule.
7	Keep the system as simple as possible, provide adequate training, and design systems outputs to fit user needs.
8	Recognise and adjust for any changes in the job content resulting from new information systems. In particular job performance evaluations and the accompanying reward systems should be modified to reflect job changes.

Moreover, Elliot (1990) presents a four-step framework, which, although deceptively simple, provides a critical structure around which the process of change can be managed. These steps are:

- assess;
- communicate;
- manage; and
- train.

Assessment of both the current organisation's corporate culture and process activities provides valuable insight into where change in needed, and how it will be received. Communication, as mentioned earlier, is a vital key to reducing resistance, and building cohesion. Management of the change process through goals, objectives and feedback allows incremental implementation of the change process. Training and education improves the probability of acceptance and success of the overall intervention strategy (Whitman et al., 1996).

As the proposed changes are implemented, it will take an equally intense process to cement them into the fabric of the corporate culture, the way the organisation will do business. To facilitate this cementing, the two basic support ideas hold true: communicate and educate. Training follows, ensuring the workers have the basic skills necessary to accomplish their tasks in the manners consistent with the new processes (Whitman, et al., 1996).

Once the final goals for the migration plan have been achieved, the new and improved processes are in place, the real work begins. The implemented change must now be integrated into the corporate culture, and must be accepted as the new 'way of life'. Support for the user continues throughout the life cycle of the organisation (Whitman, et al., 1996).

Means of overcoming the resistance can be re-mapped to the various stages of implementation. By anticipating potential causes of resistance to certain systems, the IS team can design ways and means of overcoming resistance and the 'planned

change' will be successful. The following table (Table 3.9) proposes methods from a number of researchers.

Table 3.9: Methods for Overcoming Resistance Caused by Change (After Krovi, 1993)

METHODS	ACTIVITIES
Pre-implementation strategies	Align goals of IS and organisation (Dickson and Simmons, 1970)
	Ensure that the need for change exists (Bostrom and (Heinen, 1977)
	Keep senior managers as part of top management, but make IS independent of other functional areas (Samek, 1986)
	Define and organisational standards/policies to coerce users with clear definition of roles and responsibilities (Markus, 1983)
	Allow user to express resistance (Krovi, 1993)
Strategies for the analysis stage	Provide conceptual training; ie., explain the scope of the system and its relation to the firm (Ginzberg, 1981)
	Decrease the semantic gap between user and designer (DeBrabender and Thiers, 1984)
	Seek top management commitment (Zmud, and Cox, 1979)
	Assign user responsibilities (Ginzberg, 1978)
	Set realistic deadlines for implementation (Krovi, 1993)
Strategies for the design stage	Use a prototyping approach (Krovi, 1993)
	Make the design consistent with the organisational hierarchy (Krovi, 1993)
	Provide a user friendly interface (Zmud, 1979)
Strategies for the installation stage	Provide procedural training to use the system (Bostrom and Heinen, 1977)
	Provide on-going user assistance (Krovi, 1993)
	Set-up feedback systems a for user input about the system (Krovi, 1993)
	Monitor system performance (Krovi, 1993)
	Provide ongoing assistance (Krovi, 1993)

According to Norton and Smith (1998), there are no hard and fast rules for managing change, and there are certainly no magic formulas. Key factors to cope with change are: values, leadership, strategy, customer, processes, people, control, and

integration. But there is a body of accumulated practice and experience largely derived from where things have gone wrong in the past, or where people have taken the time to get it right. They propose some practical efforts for successful change management:

- Carry out an organisational audit, which involves present and future assumptions about key functions and systems, customer expectations and core skills and competencies.
- Think the change through. Be clear on what kind of change may affect people from a broader perspective: job content, responsibility, new/unknown tasks, new methods of working, new skills, new relationships, and new threats to job security.
- Set up a team of stakeholders, not top management, but the key people involved in designing and delivering the service as well as those receiving it.
- Establish a sense of purpose and urgently tackle problems which have prevented progress in the past. Ask what or who is preventing progress, and who can really help in unblocking it? Think of breaking the code of silence that maintains the status quo. Loosen up control parameters to enable more innovativity. Put conflict to work positively.
- Plan how to get top management committed, active, and consistent. Consider how to prepare employees for change by selling the advantages meaningfully, but acknowledging any downsides honestly. Plan how to win over resistance and convert the stagnant into the active. Plan how to establish effective ownership. Allow for things to go wrong.
- Go for specific objectives. Look for early wins - but not quick fixes. Identify who can help to achieve early success, demonstrating that change is working.

Thus, selected items related to change management for e-commerce implementation are included in the research instrument of this study as possible e-commerce implementation successes. *Appendix-A and Table 5.2 of Chapter 5 provides a cross-reference of the literature and the research instrument.*

3.8 INTEGRATING E-COMMERCE INTO THE BUSINESS ORGANISATIONS

Organisations that are well integrated externally and internally build a cohesive vision and corporate culture and tend to be more resilient and responsive to the demands of the marketplace. There is a growing realisation that profitably producing and selling a top quality product (or service) at the best possible market price is not solely a function of the organisation alone, but is increasingly dependent upon the effectiveness with which the extended enterprise is managed.

Therefore, business process improvements need to extend beyond organisational boundaries to envelop and integrate with those of their trading partners. When such organisations partner with other high-quality organisations for their common good, there will be a market force to reckon with. Internet-based e-commerce ultimately is about putting all the pieces together – EDI (Electronic Data Interchange), electronic money management, and the supporting telecommunications, information management, and other technical tools (Keen and Ballance, 1997).

The main goal is the integration of business processes that span companies, geography, and business functions and its external and internal environments (as shown in Figure 3.3). This integration is the target of the virtual organisation: Quick response in retailing, agile production, so-called time-based competition, and the many efforts to realise organisational responsiveness and flexibility.

Therefore, the supply chain needs to be managed very well and should be integrated by e-commerce systems. Essentially supply chain management (SCM) is an integrating process based on the flawless delivery of basic and customised services. On the other hand integrated logistics, distribution, purchasing, and marketing, and customer response are the key factors of a successful implementation of e-commerce (Kalakota and Whinston, 1996).

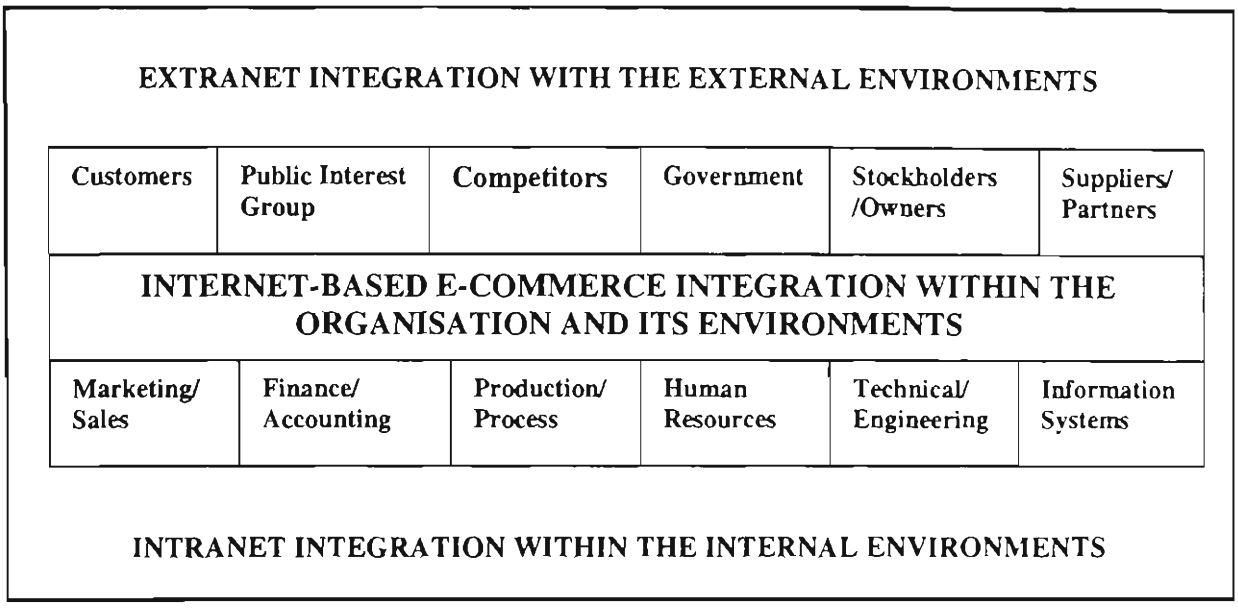

Figure 3.3: Integrating Internet-based E-Commerce into an Organisation's External and Internal Environments.

According to Kalakota and Whinston (1996), in e-commerce the integrated supply chain management has the following characteristics:

- An ability to source raw material or finished goods from anywhere in the world.
- A centralised, global business and management strategy with flawless local execution.
- Online, real-time distributed information processing to the desktop, providing total supply chain information visibility.
- The ability to manage information not only within a company but also across industries and enterprises.
- The seamless integration of all supply chain processes and measurements, including third-party suppliers, information systems, cost accounting standards, and measurement systems.
- The development and implementation of accounting models such as activity-based costing that link cost of performance are used as tools for cost reduction.
- A re-configuration of the supply chain organisation into high performance teams going from the shop floor to senior management.

Vargo and Hunt (1996) propose four levels of category in intra-organisational integration and inter-organisational integration. These four levels are:

- ***Non-integration:*** This is characterised by organisational systems that are operated largely as stand-alone applications. The lack of shared data increases drag on information flows and reduce responsiveness to the environment. This combination yields low levels of strategic benefits.

- ***Internal Integration:*** This would be typified by increasing levels of internal integration, often beginning with administrative systems and increasing integration in manufacturing systems and ending with full CIM implementations that are integrated with administrative systems.

- ***Cooperative Integration:*** Systems that support inter-organisational activities typing this level, often beginning with e-mail, e-fax (faxing from a computer), and remote access to inventory levels; then progressing through electronic data interchange (EDI) of business documents such as purchase orders and invoices; and culminating in fully functional inter-organisational systems (IOSs).

- ***Enterprise Integration:*** This is characterised by highly integrated systems, combining the best of internal integration and cooperative integration. The result is maximum responsiveness to the market environment due to an ability to effectively cooperate with trading partners as well as compete on cost and quality bases.

A short-term vision for the Internet-based Web includes establishing a presence on the Internet where users can contact the company, obtain product information, and, optionally, provide information about themselves. As e-commerce progresses, data from the Web site should be integrated with existing systems to maximise the benefits from its use (Kalakota and Whinston, 1996). While leasing space on a Web server allows achievement of the first goal – a presence on the Web – a long-range strategy that integrates Internet marketing and the sales cycle will involve having a

Web server in-house, with scripts that interface Web pages with existing order processing software in a secure way.

On the other hand, e-commerce is an integral part of the logistics revolution that marks more and more industries. Integrating logistics involves organising the firm's planning, operations, organisation, and information around processes, not around functions and departments. It includes managing the supply chain, concurrent engineering, quick response (in retailing), and such blueprints for the organisation of tomorrow as the virtual company and networked enterprise. Day –to-day transactions are the core of logistics and e-commerce (Keen and Ballance, 1997).

Cronin (1996) evaluated e-commerce integration into business functions from three different perspective:

- *Capabilities:* Link online activities with internal, back-end processes for maximum impact, distribute information and customer interaction across functions, and promote cross-functional innovation and new business applications.

- *Business Value*: More direct customer contacts, increased internal awareness of big picture and competitive issues, strategies within industry group, and opportunities for developing new products and services from integrated capabilities.

- *Web Practices:* Widespread internal Web access and internal server development, implementation of Web workgroup tools, links to internal databases and business processes, and to suppliers and customers for improved real-time control of inventory and orders.

Forrester Research (1997) released a report that details how businesses can effectively take advantage of retailing online by integrating e-commerce initiatives with existing business operations. "*The Commerce Integration Imperative*" study

recommends that companies choose e-commerce integration strategies that blend operations such as *inventory management, order processing, financials*, and *customer service.*

Forrester contends that cohesive e-commerce integration strategies are necessary in order to align online transactions with products, service delivery, turnaround, and performance. While clients and the market as a whole expect such features, many businesses also get bogged down with extra e-commerce features that can hamper resources and systems, according to Forrester. Customer experience is the key indicator in measuring successful e-commerce services and features, according to the report's findings.

Effective incorporation of existing company systems can relate whether customers are receiving consistent information and treatment, whether orders come from the Web, the phone or in person. Forrester stated that if companies neglect fluid integration, the e-commerce site might complicate customer relations and actually decrease the quality of service.

According to Forrester, "the key to a cost-effective integration strategy is to explicitly match the level of investment and complexity of the undertaking to the needs of the business, the dynamics of the market, and customer expectations, unfortunately, few online commerce operations have laid out a big picture for fully integrating their site into existing business operations."

"Commerce integration is a process, not a project and therefore companies should be prepared to constantly evaluate their status, make incremental refinements in their processes, and switch to a new trajectory as customers and systems demand change. Successful companies will continuously seek to add value to their sites by learning what their customers are doing and adapting to their needs," according to Forrester.

Some interesting e-commerce business integration examples (Keen and Ballance, 1997):

- *First Line* in the UK is a start-up provider of insurance services by phone, with no branches. First Line captured 10 percent of UK's automobile insurance market in its first two years.

- *Fidelity Investments* pre-empted traditional security brokerage and mutual funds firms in the US via phones and technology.

- *Benneton* has implemented backward integration for the entire chain of clothing manufacture and sale. Point-of-sale information triggers production decisions. All sweaters are white manufactured in Taiwan. They are not dyed until the last practical moment before they are sent to the store. Data from each store dictates what colours to dye the sweaters and in what numbers for that store.

- *Nike* is famous for being a shoe "manufacturer" that makes no shoes and retains only R&D and marketing as its core activities, out-sourcing everything else.

- *Verifone,* the maker of most of the credit card authorisation and processing devices in stores, is a company that has no offices. It lives by electronic mail; even requests for hiring secretaries are handled electronically.

Thus, integrating e-commerce into the existing business function items are included in the research instrument of this study as possible e-commerce implementation successes. *Appendix-A and Table 5.2 of Chapter 5 provides a cross-reference of the literature and the research instrument.*

3.9 E-COMMERCE SYSTEM SECURITY AND RELIABILITY

The Internet and especially its extension, the World Wide Web has been often suggested as a vehicle for e-commerce. However, to realise this, e-commerce systems must be secure and reliable. If Internet users do not have confidence that their communications are safe from unauthorised access or modification, they will be unlikely to use the Internet on a routine basis for commerce.

Therefore, conducting e-commerce over the Internet has to be completely secure. Above all else, a perception of a non-secure environment has represented one fundamental reason that has kept both consumers and business users away (Chester and Kaura, 1998). There is no single magic technology that ensures that the Internet will be secure and reliable. Accomplishing that goal requires a range of technologies (encryption, authentication, password controls, firewalls, etc.,) all supported by trustworthy management infrastructures.

Research shows that there has been considerable concern about the security of the Internet and e-commerce. Reliability and security are the major obstacles in the implementation and use of Internet-based e-commerce for business operations, especially for electronic payment transactions (Cronin, 1996; Collin, 1997; Hawryszkiewycz, 1997; Aldridge et al., 1997; Kalakota, 1997). Security on the Internet is a constant and serious concern (Verity, 1995; Bersntein et al., 1996; Bloch et al., 1996; Keating 1996; Cockburn and Wilson, 1996; Hinrichs, 1997; Forcht, et al., 1997; Solms, 1997; Wilson 1997; Lichtenstein and Swatman, 1997; Ahuja, 1997). Security and reliability concerns can be explained as follows:

3.9.1 Concerns over Security

Documents over the Internet are perceived to be vulnerable to being intercepted and/or altered by unauthorised individuals. This concern is magnified when the documents hold critical information such as the payment instructions contained in financial e-commerce documents.

Schneier (1998) classified Internet security attacks as following:

- Attacks against cryptographic designs,
- Attacks against implementations,
- Attacks against passwords,
- Attacks against hardware,
- Attacks against trust models,
- Attacks on the users,
- Attacks against failure recovery,
- Attacks against the cryptography, and
- Attack prevention versus attack detection.

Thus when addressing the issue of information security, a business does not only face the question: "what security services do I need a secure-system to provide?" but also "which secure-system will best ensure that I can continue to use my information as efficiently as possible?" When implementing a secure-system, this availability translates into the speed of operation of the secure-system, its reliability, and its ease of use.

3.9.2 Concerns over Reliability

Because of the distributed and dynamic routing of messages over the Internet, there have been concerns that e-commerce documents may get lost or delayed in transmission.

E-commerce security consists of *Internet security* (the network, system and applications components of the e-commerce solutions) and *transaction security and reliability* (the requirements for secure and reliable e-commerce transactions). According to McCartney (1997) Internet e-commerce system security is a major problem. This is currently being handled by available encryption methods, but the biggest security threat is still exists.

The lack of security, reliability and accountability make Internet transactions too risky for many users. One major fear of merchants is to shield their computers from hackers. If a hacker breaks into their system, they could steal thousands of credit card numbers. One large study found that 66 percent of respondents cited credit card fraud as a major concern about shopping online. Other concerns included unsolicited mailing lists (65 percent), merchant legitimacy (59 percent), and lack of data privacy (57 percent) (Stores, 1996). The Internet allows stockpiling of thousand of credit card numbers untraceably. Thieves use each number once, reducing the probability of investigation (Matsumoto, 1995). For instance, one master hacker stole more than 20,000 credit card numbers (Aldridge et al., 1997). Total intrusions into government, business and university computers on the Internet increased by 344 percent between 1993 and 1995 (Keating, 1996).

According to Spar and Busgang (1996), *security is the most obvious problem for Internet-based e-commerce.* An adequate level of security does not exist broadly on the Internet. Instead, as information travels through the network, it passes through many computers and sorters and is thus exposed to a host of possible points and paths of interception. The need to guarantee information integrity presents a second security problem. Once information is put online, its producers can do little to ensure that it will not be altered electronically. Thus hospitals worry about patients' records being changed, and authors and publishers are concerned that their views might be misrepresented (Spar and Busgang (1996).

Moreover, just as the nature of the Internet makes it difficult to detect the theft of information, its current structure also makes it virtually impossible to trace tampering. As the Internet grows, security problems are likely to mount. In 1990, the federally funded Computer Emergency Response team reported 130 break-ins on the Internet. According to an article in technology review, that number grew to 1,300 in 1993 and 2,300 in 1994 (Spar and Busgang (1996).

According to a research survey conducted by Cockburn and Wilson (1996), reported that the most important problems facing the future of e-commerce over the Internet

are *security* (53.6 percent) and *payment issues* (47.7 per cent). The report suggested that the general public will not be comfortable with purchasing over the Internet until they can do so safely.

RDI Computer Corporation conducted a survey on how people feel about Internet security. The majority (57 per cent) of people surveyed felt security was important. 46 per cent stated that they have experienced some type of security break-in. The top three main concerns mentioned by the respondents were unauthorised data retrieval (system privacy), password security (user privacy), and security of commerce transactions (Internet Security Survey Results, 1996). The possibility of fraud also increases significantly with the Internet because of the difficulty of accounting for use of the service. Companies need to focus more on security; however, 59 percent say they lack human resources, and 55 percent state that they do not have a budget to support Internet security (Internet Security Survey Results, 1996).

According to the results of a new survey conducted by Lycos, Inc., (1998) Internet users are more concerned about credit card transaction security, privacy, and free access to information than online violence and pornography. Cyber Dialogue, an Internet marketing researcher, designed and conducted the study for Lycos in an attempt to gauge how "cybercitizens" are affected by Internet-related concerns. Lycos reported that 86% of respondents were either "extremely concerned" or "very concerned" about the security of credit card numbers being transmitted via the Net, while 75% were interested in protecting their privacy.

Accordingly, security is the leading barrier to expanding electronic links (such as for critical applications) with the customers and partners. According to International Data Corporation (IDC, 1997) "Without a common set of specifications and products that guarantee security and reliability, the Internet may simply become an interesting public-access network."

Therefore, conducting business as proposed through e-commerce systems without fully understanding the security risks involved, will be the most serious flaw in

organisational e-commerce strategies. Unlike paper-based commerce, where policies, procedures and practices have been previously established to safeguard transactions and company assets as well as to establish audit trails, a comparable safety net is not yet fully in place for e-commerce. Digitally coded and stored information can be pilfered, modified or even deleted without detection, and the risk is magnified as more and more businesses convert their critical business information into digital form and store it on networks.

On the other hand, e-commerce has become a critical component in any business competitive strategy today. Organisations are gaining opportunities and benefits, such as global presence and improved competitiveness from e-commerce. However, the electronic infrastructure that supports online commerce is susceptible to abuse, misuse and failure in many ways. Businesses can suffer tremendously from these weaknesses. It is therefore essential for any e-commerce endeavour to identify the associated threats beforehand in order to devise a plan to mitigate the risks.

According to NCSA (1996) (National Computer Security Association, www.ncsa.com) Internet security is about protecting three things:

- The confidentiality,
- Integrity,
- Availability of data.

The NCSA states that securing Internet commerce is probably the biggest challenge that IS professionals have yet faced. There is considerable, and justifiable, fear that confidential information, such as credit cards and personal details, could be intercepted during transmission over the Internet, for example when submitting an order form on the Web. The challenge is to transmit and receive information over the Internet while ensuring that:

- It is inaccessible to anyone but sender and receiver (privacy),
- It has not been changed during transmission (integrity),

- The receiver can be sure it came from the sender (authenticity),
- The sender can be sure the receiver is genuine (non-fabrication),
- The sender cannot deny he or she sent it (non-repudiation).

Therefore, without special software, all Internet traffic travels "in the clear" and so anyone who monitors traffic can read it. This form of "attack" is relatively easy to perpetrate using freely available "packet sniffing" software since the Internet has traditional been a very 'open' network. Most of the 'local providers' or ISPs (Internet Service Providers) are considered "easy attacks" by hackers (NCSA, 1996).

McCarthy (1997) cited that the Open Recommended Solutions (OURS) consortium has identified nine basic threats to Internet Web-based applications (Internet/Intranet and E-commerce). Table 3.10 shows these security threats.

Table 3.10: The Nine Basic Threats to Internet Web Sites (After McCarthy, 1997)

THREAT TYPE		EXPLANATIONS
1.	Data destruction	Loss of data on a Web site (through accident or malice) and the interception of traffic (unencrypted or encrypted) going to or coming from the Web.
2.	Interference	The intentional re-routing of traffic or the flooding of a local Web server with inappropriate traffic in an attempt to cripple or crash the server.
3.	Modification/replacement	Altering of data on either the send or receive side of a Web transmission. The changes, whether they are accidental or not, can be difficult to detect in large transmissions.
4.	Misrepresentation/ false use of data	Offering false credentials, passwords, or other data. Also included is a person's posting of a bogus or counterfeit home page to intercept or attract traffic away from the intended destination.
5.	Repudiation	An after-the-fact denial that an online order or transaction took place.
6.	Inadvertent misuse	Accidental but inappropriate actions by approved users.
7.	Unauthorised altering/downloading	Any writing, updating, copying, etc. performed by a person that has not being granted permission to conduct such activity.
8.	Unauthorised transactions	Any use by a non-approved party.
9.	Unauthorised disclosure	Viewing of Web information by an individual not given explicit permission to have access to this information.

Today businesses fear that unwanted intruders – hackers, who use the latest technology - will use the Internet to break into their computer systems. Some examples are:

- A computer cracker who broke into a San Diego Internet service provider's computer and stole 100,000 credit card numbers has been nabbed. The thief used a "packet sniffer" program to gather the information from a dozen companies selling products over the Internet, and was arrested as he tried to peddle them to an undercover FBI agent for $260,000 (New York Times, 23 May, 1997).

- In 1997, a group of Texas hackers snatched unlisted phone numbers and personal credit information from private networks run by SBC, GTE, MCI, and Sprint and wreaked $500,000 of damage.

- A small Danish start-up announced that all Netscape browsers had a "bug" that could allow a "hacker" to read the information on the hard drive of a computer "surfing" the WWW even if it were behind a protective "firewall" (CNN, June 21, 1997).

- The Internet Society, in Reston, Virginia, estimates that about 30,000 organisations that would link up to the Internet have not done so due to security reasons (1997).

- In 1996, Multiple Viruses (Word Macro Virus) that inflict Denial of service (Ahuja, 1997).

- In May 1996, US General Accounting Office reported that computer hackers cruising the Internet pose a serious and growing threat to national security with Pentagon computers suffering as many as 250,000 "attacks" in 1995, most made through the Internet. In about 65 percent of stop passwords stealing altogether (New York Times, 23 May, 1996).

- In 1995, $10 million stolen from Citibank; most of the stolen money was recovered (Ahuja, 1997).

- In October, 1994, newspapers revealed that a group of hackers had stolen valuable copies of new software from such companies as Microsoft and IBM kept at Florida State University. The thieves quietly made the software available through the Internet. Most of the recipients of the free software were not from the US, highlighting the worldwide nature of the problem.

- In September, 1994, it was revealed that the underlying software formula for a data encryption system belonging to RSA Data Security Inc, of Redwood City, California, was being distributed on the Internet. Data encryption, where data are scrambled into a coded form for transmission over a communications network, is viewed as on effective protection against data thieves. Now that its coding has been circulated on the Internet, data transmitted using RSD software are no longer secure (Datamation, October 1, 1994).

- In October 1993, a group of hackers broke into the computer of Panix (Public Access Network Corp), a commercial seller of access to the Internet. The hackers had embedded a program in the Panix computer that collected passwords from users of the Panix system. With those passwords, the hackers were then able to access other computers connected to the Internet, to steal both data and more passwords. The security of the whole system had been compromised (New York Times, October 30, 1993).

According to a survey conducted by Datamation (1996) with the large US companies, 60% of respondents had not installed an e-commerce system and had no plans to do so within the next three years. Internet security concerns were the No. 2 reason cited for not jumping on the e-commerce bandwagon (implementation cost was the No. 1 reason).

Similarly a survey, entitled "Internet Technology Services," conducted by Deloitte & Touche (1997) with leading US-based banks reported that, 80% of respondents report security is a major reservation for the e-commerce implementation.

It is thus more likely that until security is improved, businesses will only use the Internet for public information, while keeping confidential information in secure private networks. Thus, possible applications of the found on public networks are those that include information that can be generally known rather than being confidential to a business.

Security and confidentiality often come into question when choosing what to place on public computer networks. This becomes particularly important with commercially confidential information. What is needed is a method to identify possible threats, a way to assess the risk to the site of these threats, and a way to determine preventative action to eliminate the threats. The kinds of possible threats are (Hawryszkiewycz, 1997):

- Impersonation to get information;
- Unauthorised use of information, as for example, costs quoted for a contract;
- Unauthorised disclosure;
- Theft and fraud;
- Denial of service;
- Alteration of message; and
- Repudiation actions.

Generally, the lack of security is caused by the weaknesses of encryption technology and the destructive power of computer viruses. Currently many companies, particularly in the US, are starting to adopt firewall supported encryption techniques that allow credit-card numbers to be sent safely across the Internet. The rise in demand for such credit services has resulted in numerous encrypt systems with different standards flooding the Internet marketplace. For example, VISA teamed up with Microsoft to produce a set of specifications called "*Secure Transaction*

Technology," while MasterCard joint-produced with other organisations an alternative set of specifications known as "*Secure Electronic Payment Protocol*."

Each encryption technique developed has its own set of limitations and vulnerabilities that may or may not be able to certify the legitimacy of persons buying or selling over the Internet. These competing standards not only complicate the recognition capability of both merchant and customer, but also offer computer hackers more opportunities to break the encryption system and abuse the use of obtained credit-card numbers or information.

According to Deloitte Consulting (1997), until now, businesses have been hesitant to adopt e-commerce because of security concerns or the perception that their customers simply aren't using it to buy products and services. Now, companies are coming to the realisation that security will always be an issue - but that it is less of a concern than missing out on a vital new channel that could provide a tremendous competitive advantage (http://www.cyberdialogue.com).

Security-related privacy concern is one of the most important drawbacks from using Internet-based e-commerce which replaces censorship as the number one concern of business and consumer users. Research show that, privacy is the most important issue facing the Internet. With the Internet commercialisation, concern has arisen over the privacy of information that individuals disclose online. With little oversight, few Web sites clearly say how they might use personal information such as age and income. People are not being told that information is being collected - but more importantly, the information being collected is being used for different purposes.

3.9.3 Securing Users' Trust

As companies look for ways to reduce costs, they are turning to the Internet as a possible solution. Transacting business over a public network like the Web instantly raises the issue of security. But can the Internet provide a low-cost, real-time

communications platform for transporting data between trading partners? What about reliability and security.

The single greatest aversion to conducting commerce online is trust. Reliability and security are two of the most important elements of a successful e-commerce program. By combining biometric identification methods such as fingerprint imaging and iris scanning with digital certificates, transactions can be biometrically secured, protected and guaranteed from end-to-end. This process can dramatically reduce fraud, cut costs, and increase confidence in doing business electronically. Critical installation components and interfaces must be completed to ensure security on the Internet.

To solve security issues from management, organisational and technological perspective, Internet and communications security implementation requires:

- *Authorisation:* ensuring authorised uses of systems and performance of business functions by authorised users only.
- *Authentication:* establishing that parties to an electronic transaction or communication are who they claim they are.
- *Integrity:* ensuring that data on the host system or in transmission is not intercepted, modified or deleted illicitly.
- *Confidentiality:* warranting that data is only revealed to parties who have a legitimate need.
- *Availability:* ensuring that legitimate access to information and services is provided.
- *Non-repudiation:* if a party to some transaction or communication later denies that it has ever happened, some mechanism is in place to facilitate dispute resolution (ie. digital certification).
- *Privacy:* ensuring that customers' personal data collected from their electronic transactions are protected from indecent and/or unauthorised disclosure.
- *Encryption*: data encryption scrambles data to prevent it from being read or tampered with during transit. Only those with the right key can read it.

- *Firewalls:* perimeter security can be achieved by using firewalls (for commercial transaction protection).
- *SSL (Secure Socket Layer):* is a channel-based security which secures the channel being used.

Availability is a crucial issue when implementing security. This is particularly true in the commercial arena. For example; an extremely secure electronic payment system is virtually useless if it is not able to operate fast enough to handle consumers' needs, or if it restricts the volume of trade so that merchants are forced to turn customers away.

On the other hand, network technology is still immature and highly complex (Laudon and Laudon, 1997). Enterprise networking is highly sensitive to different versions of operating systems and network management software, with some applications requiring specific versions of each. It is difficult to make all of the components of large heterogeneous networks work together as smoothly as management envisions. Tools for managing distributed networks are also in their infancy (Laudon and Laudon, 1997).

Security is of paramount importance in organisations where information systems make extensive use of networks. Networks present end-users, hackers, and thieves with many points of access and opportunities to steal or modify data in networks. Moreover, because users may simultaneously access several different computers (their client plus one or more servers) with different security systems, access can become complex and interfere with the user's productivity.

3.9.4 The Importance of E-Commerce Security

Companies implementing e-commerce face a daunting challenge: minimise risk in a world of increasing vulnerability. Key network strategies can improve a company's time-to-market, increase sales, reduce cost of ownership and improve customer service - all while minimising security risks.

The key to any secure communications system is accurate identification of users to prevent unauthorised access to information and resources. Through the use of secure smart cards, e-mail messages, purchase orders, credit card numbers and other confidential transmissions can be secured as they are sent and only opened by the intended recipient.

Table 3.11 below is the summary of the CDB Research & Consulting firm' survey on the demographics of Internet users and the result on the safety of buying products online with a credit card:

Table 3.11: Opinions on the Safety of Buying Products Online with a Credit Card (Source: CDB Research & Consulting (http://www.cdbresearch.com)

Opinions on the E-Commerce Safety	Percentage (%)
Very safe	11
Safe	9
Somewhat safe	13
Somewhat unsafe	26
Very unsafe	26

Research shows that there are six signs that a company has been hacked:

- Unknown account added to the system,
- Excessive log-on failures,
- Unexpected crashes or re-boots of the computer,
- Missing logs or gaps in records,
- Heavy traffic after midnight,
- System logs that quickly fill up.

According to Laudon and Laudon (1997), solving the security problems require a systematic approach as following:

- Controls over the system implementation process
- Software controls
- Physical hardware controls

- Computer operations controls
- Administrative discipline, standards, and procedures.

Hinrichs (1997) stated that the Internet security policy should include a formalised process which communicates the security policy to all users. In addition, an educational campaign should make users aware of how computer and network systems are expected to be used and how to protect themselves from unauthorised users. All users need to be informed about what is considered the "proper" use of their account and work-station. Users should also be told how to detect unauthorised access to their account. (Hinrichs, 1997).

According to Dhillon (1997), in the case of security, implementations should be based on the following principles:

- Successful implementation of security measures can be brought about if analysts consider the informal organisation before the formal. The implementation program should concentrate on educational programs, which aims to teach new values, and introduce new forms of structures.
- Implementation of security measures should take a 'situational issue-centred' approach.
- To facilitate successful implementation of security controls, organisations need to share and develop expertise and commitment between the 'experts' and managers.

As for Internet-based e-commerce implementation strategies, users, merchants, and financial institutions need a trustworthy system for ensuring that transactions are secure between the end-user and a company. Without secure encryption, the use of the Internet for e-commerce will be hampered (Fairchild, 1996).

"The risks of working and doing business in cyberspace are present because there is also tremendous potential for reward. As long as we keep our eyes open, assess the

risks realistically, and take intelligent precautions, we can navigate cyberspace knowing that our own networks are safe from unwanted intrusion" (Russell, 1995).

Security and reliability related items are included in the research instrument of this study as possible Internet-based e-commerce implementation successes. *Appendix-A and Table 5.2 of Chapter 5 provides a cross-reference of the literature and the research instrument.*

3.10 IS/E-COMMERCE IMPLEMENTATION CASES, ARTICLES AND SURVEYS

According to a study by Forrester Research, Inc., (1997) the value of retail electronic commerce could skyrocket from the $500 million to $7 billion by the year 2000—with 435,000 businesses engaged in e-commerce. *The report stated that, projected e-commerce will reach $350 billion by 2002 from just $8 billion in 1997, including direct sales to consumers and transactions between businesses.*

Doing business via the Internet results in cost savings of 5% to 10% of sales (a rough average based on the experience of a variety of early adopters). For example: Dell Computer Corp. selling $1 million worth of computers a day on its Internet Web site. In just six months, Dell has gone from nowhere in cyberspace to being the No.1 PC retailer on the Web - with sales growing 20% each month (Business Week, 1997). In a May 1996 survey, Deloitte & Touche found that over 60 percent of Internet-capable users had made an online purchase within the previous 12 months. In 1997, over half of all current Web users spend time searching the Internet for information before making a purchase.

According to research conducted by Tradegate ECA (1998) on its membership base of around 1000 private and public sector organisations, at least $25 billion worth of goods and services is now traded in business-to-business electronic commerce in Australia, mainly in retail, manufacturing and government taxation collection. "The use of all forms of electronic commerce continues to grow at a huge rate, and

confidently anticipates that by 2005 almost 50 per cent of all business-to-business transactions will be done electronically," according to Tradegate ECA.

Tradegate ECA's survey indicates that in the past three years electronic messaging grow by 30 per cent in the trade and transport sectors alone and the growth in business-to-business e-commerce is likely to be substantially greater than business-to-consumer e-commerce. According to Tradegate ECA, on the Internet, where more than 20,000 Australian companies now have their own domain names, growth in e-commerce is also likely to be focused on the business-to-business market.

EDI users in Australia number approximately 10,000 to 12,000 across a range of industries including retail, automotive, grocery, metals, and soft-goods manufacturing, road, rail and air transport, telecommunications, pharmaceutical manufacturing and distribution and a range of Government services including customs, taxation services, and Government purchasing and supply. Over 10,000 companies now use the international EAN/UCC standard numbering and barcoding system for automatic data capture, which when used together with standards-based EDI provides for accurate and timely information with resultant lower costs.

On the other hand, a 1997 survey conducted by E&Y Consultant Company shows that the primary reasons for using Internet-based e-commerce, in ranked order were:

- to respond customer/supplier requests more effectively;
- to gain real-time access to information;
- to cut costs;
- to increase the accuracy of data with a concurrent reduction in errors; and
- to gain a competitive advantage.

These benefits, particularly cost reduction and sales increase, are most likely to be realised by large companies which integrate e-commerce into business systems. Transaction costs may not be substantially lower for smaller companies that

implement e-commerce; instead, small and mid-sized companies primary rationale to implement e-commerce is the competitive advantage it can provide.

Therefore, it is very important for small businesses to set up their business operations in such a way that the Internet, as an enabling tool, can actually streamline these operations and allow the business to be more effective and efficient. For example, if a small business provides an ordering facility accessible via the Internet, it must also assure the customer that products will be delivered as rapidly and efficiently as if they were ordered in any other way. It is also essential that delivery process itself be streamlined. No incentive is provided for customers to switch to an ordering process, which takes only a few seconds, unless the goods themselves can also be delivered faster than normal.

A similar survey conducted by Soh, et al. (1997) shows that the primary reasons for using Internet-based e-commerce in Singaporean businesses in ranked order were:

- to market themselves both locally and globally;
- to gather requisite information by searching other Web sites or gather consumers' feedback;
- to provide customer services and support; and
- to conduct electronic transactions.

Companies start their e-commerce for different reasons. However, based on the literature survey, there are some typical driving forces for companies to embark on e-commerce implementation.

According to the ABC News (February 1998), e-commerce implementation across Australian businesses doubling every six months due to increase of sales motivation. Various reliable surveys from around the world (for instance, IDC, CIO, Activemedia, Forrester Research, Jupiter, Computerworld, etc.) show that sale focused motivational elements were the major driving forces to e-commerce implementation. Some of these elements are:

- Reduce cost of operations;
- Improve speed (from order to delivery);
- Increase sales and profit;
- Real time communication;
- Satisfy the needs of customers;
- Ability to capture more market share;
- Reach potential customers;
- Improve company's image;
- Paperless work;
- Increase productivity;
- Pressures from globalisation; and
- Achieve competitive advantage.

According to a survey by market researcher Activemedia (1997), the number of profitable Web sites - both for consumers and for inter-business transactions - jumped to 46%, ending three year of stagnation at 30%, and some 81% of the remainder expect to be profitable in a year or two. Interestingly same report found that, 19% of the Web sites are not generating any revenue.

Keen and Balance (1997) reported some success stories resulted from Internet-based e-commerce implementation:

- *Automotive manufacturers* cut processing and administrative costs from an average of $61 to $6 per truck shipment by eliminating invoices and other paper documents, using E-commerce to match order to delivery.

- *Digital Equipment Corporation* cut procurement lead times by 30 percent and inventory levels by 90 percent between 1987 and 1993 by using EDI for over $4 billion worth of procurement of materials, supplies, and services a year.

- *Thermo King*, a firm with $65 million sales, cut order costs from $50 to $10 for each of 20,000 spare parts items; with "hard" savings of $3.4 million in

inventory-stocking costs and the release of $4.9 million of cash from reduced inventory.

- *General Electric* cut materials inventory from 7 weeks' supply to 2.5 and reduced suppliers' inventory by half. Material lead times dropped from 60 to 10 days and the cost of purchase order from $52 to $12.

- *Pacific Bell* cut purchase cycle time by 13 days through the use of basic EDI, another 17 days by adding advanced shipment electronic notices and bar coding, and yet another 13 days by adding electronic funds transfers.

- *Texas Instruments* linked EDI to bar coding for tracking office supplies. The corporation also was able to free up 40,000 square feet of warehouse space, worth close to $1 million a year, cut inventory by $2 million, and reduce cycle time from 3 days to 1. Error rates at TI are now 1 in 10,000 orders where they once were 1 in 25.

- *IBM* in Fishkill, New York, reduced the number of purchase orders per year from 7,700 to 970 for the same volume of goods and reduced the number of suppliers from 718 to 8, with an average of 9 percent price cut in return for volumes. IBM also used EDI to cut a 6 percent error rate for incoming shipments to close to zero and to achieve 65 percent savings in inventory carrying costs.

- *Grocery industry survey* shows that before EDI, almost 30 percent of suppliers invoices were "in dispute" because of some processing error; with EDI, the figure is close to zero.

- *1,560 EDI users* surveyed in the US in 1994 reported error rates cut from 10 percent to 4 percent and cycle time reduced by 40 percent on average.

- *One hundred car dealers* surveyed reported that they were able to cut the time needed to process paper-based car loan applications from 1 to 2 weeks to as short as 1 minute, with 25 percent of the applications requiring no human intervention.

Moreover, according to Laudon and Laudon (1997), the most benefits of the Internet –based e-commerce to organisations are:

- Reducing communication costs,
- Enhancing communication and coordination, and
- Accelerating the distribution of knowledge.

Fuller and Jenkins (1995), in their experimental case study of business Internet usage by SMEs in Britain identify six activity benefits:

- Time-based competitive advantage;
- Productivity improvement;
- Business process re-engineering;
- Empowerment of individual employees;
- Establishing and maintaining business networks (relationships); and
- Reaching new markets.

In addition, Barker (1994) identifies the following activities of uses by small business on the Internet:

- Finding customers, through scanning of newsgroups and advertising,
- Finding specific and detailed information for marketing purposes,
- Obtaining a source of new ideas/opportunities,
- Obtaining low cost communication,
- Keeping in touch/Networking,
- General/global awareness and environmental scanning,
- Customer/supplier support,
- Geographic reach/general accessibility,

- More productive communications (less paperwork, greater speed, no telephone tag etc.), and
- Stature/experience/keeping ahead of the competition.

According to Laudon and Laudon (1997), the potential implementation problems posed by enterprise networking are:

- Loss of management control over information systems,
- Organisational change requirements,
- Hidden costs of client-server computing, and
- Network reliability and security.

A well-developed training program can help end-users overcome problems resulting from the lack of management support and understanding of desktop computing (Westin et. al., 1985; Bikson et al., 1988). Technical specialists will need training in client/server development and network support methods.

Web-savvy growth companies are using their sites for more than advertising and product information, according to PricewaterhouseCoopers LLP's (1998) survey. 61% of the companies surveyed are also using them to build *customer relationships.* And 60% use them to invite comments and feedback, according to the company's "Trendsetter Barometer" report. PricewaterhouseCoopers "Trendsetter Barometer" interviewed CEOs of 446 product and service companies identified in the media as the fastest growing U.S. businesses over the last five years. Half of the CEOs say their companies are recognised as high-tech firms.

According to the PricewaterhouseCoopers, companies that understand the concept of 'virtual communities' are positioning themselves to capture the hearts and minds of their customers. These firms know that creating virtual communities will help them better understand and bond with the customer, essential to building market share in today's knowledge economy. In addition to developing relationships with their customers and prospects, "Trendsetter" growth companies use their Web sites in a

number of different ways. Most use them to advertise (94%), provide in-depth product or service information (85%) and obtain new sales leads (71%). Moreover, slightly more than half (51%) include their Web sites in employee recruitment efforts, and 50% use them to provide services to customers. Only 32% of the companies with a Web presence use it for direct sales of products or services. This low percentage is undoubtedly rooted in concerns about privacy and electronic commerce security. Even among risk-taking growth companies, e-commerce security remains an issue with which they must grapple. In addition to Internet penetration, bandwidth presents another challenge to e-commerce growth. Greater bandwidth - availability, dependability, and speed - is crucial to building positive consumer experiences and, therefore, enabling people to feel more confident participating in e-commerce activities, the study stated.

On the other hand, Rowley and Smiley (1991) in a case study report suggested that the IT/IS department should provide timely and high quality assistance to its users and its senior managers. Users are demanding responsive, affordable applications that they can access easily on their personal computers. Rowley and Smiley studied the IT/IS department of BellSouth Enterprises Inc., and argued that their findings are generalisable or applicable to any computerised information system. They discussed three principles for successful IS implementation that will improve an IT/IS department's proper managing of its resources and better support the users. Their three principles for IS implementation are briefly stated as:

- A focus on line management decision making; a line manager's specific needs must be identified and confirmed to in the design of IS.
- A definition of the roles and shared responsibilities for the IT/IS resources.
- A restructuring of the IT/IS department into an investment centre.

Thus, the new IT/IS department should be able to support its users with the information necessary to achieve a competitive advantage. This research confirmed from Rowley and Smiley's concept of the IT department's role in an implementation environment that an IS/e-commerce department should be able to communicate with

its user departments and provide the requested supports and manage the IS/e-commerce resources accordingly.

Ehrenreich (1992) stated that successful IT/IS implementation benefits are:

- Time savings,
- Faster response to queries and jobs,
- Applications run more quickly and efficiently,
- Users can share information in multi-vendor computing environments, and
- Users can take advantage of multi-tasking capabilities.

Ehrenreich (1992) also suggested that successful IS implementation allows an organisation to move resources where they can be performed most effectively, improve response time and customer service. Successful IS implementation can also facilitate the use of new network-based multimedia technologies. *Therefore, this study includes in the questionnaire time-saving with system development; cost-savings in business operations, maintenance and e-commerce resource management; overall productivity; and applications efficiency.*

A survey of delegates to a conference in Queensland showed that Australia still has concerns about electronic commerce, and about the speed and security of the Internet. Forrester Research (1998) conducted a survey at the Open Systems Forum, the annual networking conference held by systems integrator Com Tech at Coolum, Queensland in 1998. The survey included around 180 customers of Com Tech, comprising network managers and CIOs from some of Australia's largest enterprises. Survey results show that:

- Lack of co-ordination between departments was the biggest challenge in implementing an Internet commerce strategy, with 41 percent of the vote.

- Lack of management support was next at 23 percent, followed by funding woes (13), shortfalls in customer demand (12) and technology hurdles (11). On the

question of the perceptions of the Internet's speed, 69 percent of delegates responded that it was too slow, 24 said it was "just OK", and eight percent maintained it was fast enough or very fast.

- 73 percent of Australian delegates said the Net was not secure, 26 percent said it was secure enough, and only one of the 174 polled said it was very secure.

On the other hand, US Government released a report called "*A Framework for Global Electronic Commerce*," as part of its e-commerce policy (July 1, 1997). The United States government has prepared this report in order to set-up strategies to help accelerate the growth of global commerce across the Internet. This framework outlines the Administration's strategy for fostering increased business and consumer confidence in the use of electronic networks for commerce. The paper reflects widespread consultation with industry, consumers groups, and the Internet community.

This framework establishes a set of principles to guide policy development, outlines the US Administration positions on a number of key issues related to electronic commerce, and provides a road map for international negotiations, where appropriate. It also identifies which government agencies will take the lead in implementing this work. According to the report, the US Administration has developed this framework because it is a critical element of the Administration's agenda on trade and technology as it discusses the commercial implications of the Global Information Infrastructure (GII).

The paper presents five principles to guide government support for the evolution of electronic commerce and makes recommendations about nine key areas where international efforts are needed to preserve the Internet as a non-regulatory medium, one in which competition and consumer choice will shape the marketplace. With respect to these areas, the paper designates lead U.S. government agencies and recommends international fora for consideration of each issue. The five principles are:

1. *The private sector should lead.* The Internet should develop as a market driven arena not a regulated industry. Even where collective action is necessary, governments should encourage industry self-regulation and private sector leadership where possible.

2. *Governments should avoid undue restrictions on electronic commerce.* In general, parties should be able to enter into legitimate agreements to buy and sell products and services across the Internet with minimal government involvement or intervention. Governments should refrain from imposing new and unnecessary regulations, bureaucratic procedures or new taxes and tariffs on commercial activities that take place via the Internet.

3. *Where governmental involvement is needed, its aim should be to support and enforce a predictable, minimalist, consistent and simple legal environment for commerce.* Where government intervention is necessary, its role should be to ensure competition, protect intellectual property and privacy, prevent fraud, foster transparency, and facilitate dispute resolution, not to regulate.

4. *Governments should recognise the unique qualities of the Internet.* The genius and explosive success of the Internet can be attributed in part to its decentralised nature and to its tradition of bottom-up governance. Accordingly, the regulatory frameworks established over the past 60 years for telecommunication, radio and television may not fit the Internet. Existing laws and regulations that may hinder electronic commerce should be reviewed and revised or eliminated to reflect the needs of the new electronic age.

5. *Electronic commerce on the Internet should be facilitated on a global basis.* The Internet is a global marketplace. The legal framework supporting commercial transactions should be consistent and predictable regardless of the jurisdiction in which a particular buyer and seller reside.

A survey of small and medium businesses (SMBs) conducted by The Yankee Group (1998) illustrates that the overwhelming majority of SMBs have not strategically embraced the Internet as a business tool, nor do they grasp the opportunities the Internet presents to level the playing field with larger companies. Small businesses may not be embracing the opportunities the Internet offers them, and the reason may be a lack of the proper tools, and the traditional concerns of cost and security.

Among the small (2-99 employees) and medium (100-499) businesses surveyed by the Yankee Group, an average of only 30 percent stated that the Internet was "important to achieving business goals." In fact, although 61 percent of small businesses and 82 percent of medium businesses report they have some form of Internet access, only 50 percent of all PCs in small businesses and 31 percent within medium businesses have Internet access, according to the Yankee Group.

The Yankee Group findings also found that small businesses have yet to move beyond a simple Web presence to an interactive site. Survey results identified a three-phase process that SMBs undergo over time as their Internet commitment strengthens -- connectivity, customer connections, and commerce. More than two-thirds of the companies we surveyed have yet to even move into the customer connection phase. According to the Yankee Group research, most companies are still in the earliest phase of Internet adoption, with only 31 percent of small and 51 percent of medium size businesses maintaining some type of Web presence. Approximately 55 percent of small businesses and 66 percent of medium businesses without Internet access have no plans to add it.

A survey report by Cahners In-Stat Group (1998) showed that only 28 percent of small business Internet commerce implementers have enabled online ordering and only 19 percent accept online payments. The point: small companies may have been among the first to get on the Internet, but they are slow in moving beyond "brochure" sites. Research found that the chief obstacles to implementing e-commerce identified by the small businesses surveyed are cost, security concerns, difficulties in implementing and maintaining commerce sites, and customer service concerns.

According to the In-Stat report, consulting services and modular products that make implementation easy and safe may be the key to getting small business to become players in the Internet game.

This study can conclude that e-commerce implementation does not necessarily imply the complete replacement of current IT/IS systems for an e-commerce system implementation. This research study takes the claimed advantages, disadvantages and potential costs as the guidelines for selecting variables in the research instrument. Some of the items are included in the research instrument.

3.11 EXPERT RECOMMENDATIONS FOR IS/E-COMMERCE IMPLEMENTATION SUCCESS

According to Levitt (1995), to achieve success with the Internet commerce implementation, first one must define the goals and expectations. Then the strategy must be carefully planned and executed, with support from the highest levels of the company. Only with this support will such an effort truly succeed. Many Internet marketing or presence efforts will fail because of a lack of corporate commitment and the wrong supporting structure. Levitt also suggests that if planned for and implemented carefully, the Internet is a wonderful tool for fostering increased communication between customer and supplier, and between business partners. As a result, most of the benefits in the short term will come from traditional e-mail activities. According to him, a company must follow if not all of these guidelines:

- Gain executive commitment – both people and funding,
- Assign ownership and accountability for the *net.presence* to the marketing organisation,
- Build a cross-discipline committee from sales, marketing, IS customer support, R&D, manufacturing, service - all major functional groups within the company,
- Appoint a Webmaster to "own" the site and keep up on what's hot elsewhere on the Net,

- Appoint a *net.monitor* to be the focal point for incoming e-mail and to monitor Usenet traffic, either through a direct presence or through the use of a search utility like InfoSeek,
- Establish rational expectations,
- Don't chintz on the investment in people, training, equipment or software. Use commercial grade equipment from companies that provide training and support.
- Integrate the *net.presence* with other marketing/service/support activities,
- Invest in a "quality" presence, don't throw just anything up on the Web to have a presence,
- Track the results in sales, service, support, awareness, etc, and
- Commit to the presence for the long term.

The world's richest man and owner of Microsoft Corporation, Gates (1995) expressed that he had personally banned the use of more than 200 paper forms. The result of this move away from paper towards e-mail - a key element of his vision of computers as the "*digital nervous system*" of the information economy - was that employees felt empowered and companies were able to change their strategies more quickly.

According to Callon (1996), there are four critical points for a new IS implementation success:

- Never implement a new system without first simplifying the process. Maximise the value-added steps and minimise the non-value-added steps.
- After working with the users to develop a solution to their problem, make sure to stay around to help them articulate how the solution will solve their problem. They understand their part of the solution but will probably need help in explaining how information technology is going to provide the best possible solution.
- Get senior commitment and support for the new system implementation.
- Implement through user ownership of any new system. The users may not actually own the equipment (hardware and software) on which the system is

implemented, but they have a sense of ownership of the system itself. Owners will do a much better job of successfully implementing and utilising a new system.

Further, Dagenais (1991) recommended some critical issues for IT/IS implementation success as follows:

- Define the implementation objectives and select the key and appropriate applications for them.
- Make sure that the required software is available for the implemented hardware platform or can be developed within a reasonable time at an acceptable cost.
- Clearly define the constraints on the nature of the application, system availability, developers, consultants and management. Define standards as well.
- Carefully inspect cost-effective analysis; be sure to include all costs and benefits.
- Select available hardware platform to assure adequate response time and system requirement.
- Ensure that the users and IT/IS staffs understand the new hardware and software applications.
- Deal with IT/IS implementation issues with System Development Life Cycle concepts.

Oracle Corporation (1997, www.oracle.com) recommends seven key strategies for Internet-based e-commerce implementation success:

- **High Performance, Scalability, and Flexibility.** Powerful, scalable, and flexible software is the foundation of an Internet-based system that can expand with changes in technology, trading-partner demands, and business requirements. For example, if your company expands its operations to Latin America, your network architecture must be able to meet the new demands of the business.

- **Efficient Links to Business Partners.** Companies must be able to link their existing enterprise-resource-planning (ERP) business applications or legacy

systems with disparate applications from suppliers and customers. By providing efficient links to business partners, your company is able to manage a more efficient supply chain, thereby reducing costs and improving communication.

- **Process Control.** The goal of an Internet-based implementation is to improve and streamline supplier and customer relationships. Thus, an important element of Web-based business software is a pro-active tracking and reporting system for efficient trading-partner response. Event-driven features can help ensure that critical customer and supplier deadlines are met.

- **Security.** A Web-based solution must protect sensitive company data. Protecting business information requires an integrated approach that ensures the confidentiality of incoming and outgoing messages. Generally, your system must decrypt incoming data and encrypt outgoing data - and it must authenticate both forms of communication. Encryption must also provide flexible options, to determine appropriate levels of security for each trading partner and to efficiently manage shared access in a multi-user environment.

- **Data Archives and Auditing.** To support contractual and legal needs and to create a smooth audit process, your electronic-business architecture must be ready to archive data at any time in the processing cycle. This provides the ability to review and audit records to ensure that electronic-business processes are carried out according to established business procedures.

- **Non-stop Performance.** In nearly any business, rapid information flow is critical, and nowhere is this more true than in Internet-based systems. Your system should be able to process transactions continuously, with little human intervention. If errors or exceptions occur, an event-management system should automatically detect them and notify the system manager. Backup systems should also be in place in case of failure.

- **Support and Training.** To update an old cliché, your supply chain is only as strong as its weakest link. Your vendors and business partners need to be well trained on the system and provided with 24-hour global support to keep business moving along.

According to NCSA (1996), there is a wealth of security issues that will continue to require attention when implementing an e-commerce system:

- Internal security (in all surveys to date, at least 75 percent of all information security infractions are by insiders and the figure is comparable or higher for credit card and commercial fraud),

- Continued hacking (system will need to evolve as hacking eats away at current technology - the process is iterative and never – ending),

- Social engineering (without proper security awareness training, organisations will continue to be susceptible to costly social engineering attacks),

- Malicious code (this will continue to impose overheads on all open network systems and is likely to prosper in enhanced functionality environments such as Java and OLE, the Microsoft Internet Safe Code Initiative notwithstanding),

- Reliability and performance (problems with backbones and DNS servers are common at the moment and most current dial-up PPP connections are notoriously unreliable and slow, which will probably not improve until there is widespread use of ISDN),

- Skills shortages (there are not enough people who know enough about how this technology works, a problem only made worse by the 24x7 up-time requirements of the global Internet), and

- Denial of service attacks (using brute force with malice or extortion as the motive, hardware and software independent and possibly "encouraged" by improvements in confidentiality and integrity mechanisms).

Having utilised all the Internet and e-commerce experts' experience and advice, this study's research instrument should contain all the important variables that are recognised by them and the previous CSF studies. Therefore, this research study performs an empirical study on these variables for identifying CSF for Internet-based e-commerce implementation success. *Appendix-A and Table 5.2 of Chapter 5 provides a cross-reference of the literature and the variables of the research instrument.*

For identification of variables to be included in the research, *Appendix-A* summarises all of the variables identified in the literature and categorises the variables according to the proposed type of CSF for Internet-based e-commerce implementation success.

CHAPTER 4

STATEMENT OF RESEARCH HYPOTHESES

Keep on the lookout for novel and interesting ideas that others have used successfully. Your idea has to be original only in its adaptation to the problem you're currently working on.

Thomas Edison (The Inventor of Electricity)

4.1 GENERAL

This chapter describes the proposed research hypotheses which are derived from the literature survey. The hypotheses for this study can be grouped according to the expected critical success factors (CSFs) for Internet-based e-commerce implementation success. The ten general hypotheses to be tested in this study are numbered for identification based on the review of literature.

The components of *Appendix-A* which summarised the variables from the literature, constituted this research model. As mentioned in the previous section, variables included in the model are drawn mainly from the previous CSF studies [ie. Rockart (1982), Martin (1982), Magal et al. (1988), Bergeron et al. (1993), Cavaye (1995) etc.,] and two Focus Group discussions, journal papers, business magazines, online papers, conference presentations, case discussions, surveys, books, and newspapers. Recommendations from the professional IS/e-commerce consultants, experts or executives who have practical experience with Internet-based e-commerce in Australian corporations have also been used in this study.

The research model (Figure 4.1) shows the proposed relationships among the ten critical success factors and Internet-based e-commerce implementation success in Australian organisations. The ten proposed critical success factors (CSFs) of successful implementation of Internet-based e-commerce are:

1. Top Management Commitment and Support for E-Commerce Implementation,

2. Communication, Training, and Facilitation of E-Commerce Department and Users,
3. User Appreciation of E-Commerce System,
4. E-Commerce Department's Service Function,
5. E-Commerce Integration with Organisation's Existing Business Functions,
6. Organisational Effectiveness for E-Commerce System,
7. Change Management (Managing Technological and Organisational Change),
8. Internet/E-Commerce System Security and Reliability,
9. Technological Competence for E-Commerce, and
10. E-Commerce System Applications.

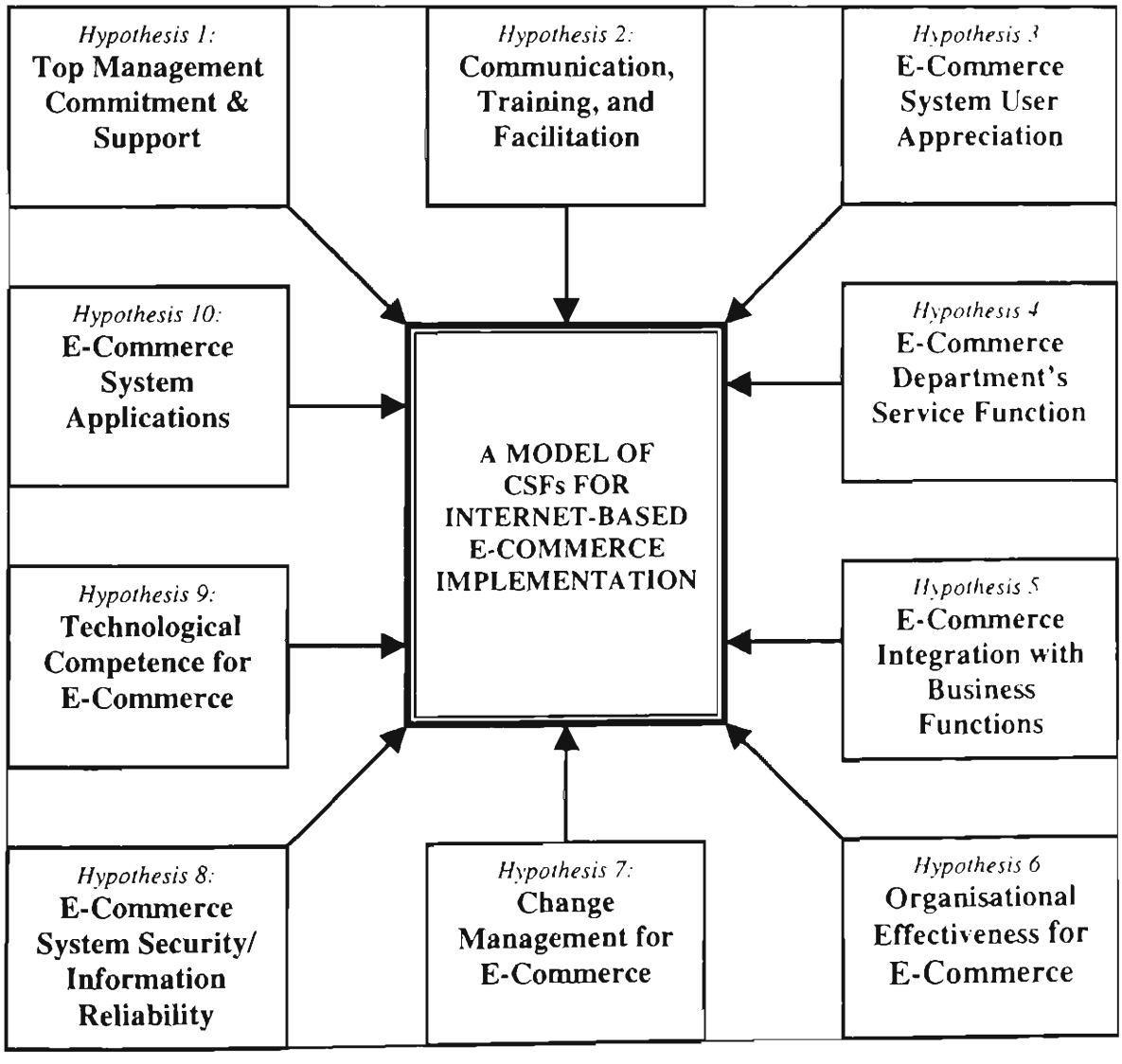

Figure 4.1: The Proposed Conceptual Research Model for Internet-based E-Commerce Implementation Success in Business Operations

The proposal of this study is that these ten factors will be related to the strategic success of Internet-based e-commerce implementation in Australian businesses as defined by Internet and electronic commerce executives and managers.

4.2 MANAGEMENT COMMITMENT AND SUPPORT FOR E-COMMERCE IMPLEMENTATION

The key to successful implementation of Internet-based e-commerce is top management's deep and lasting commitment and support. In an organisation, the support of management is usually necessary for any innovation (like the Internet and e-commerce) to take place (Ruth and Schware, 1996). Without support from top management and their willingness to make investments, it is impossible for e-commerce projects to be approved. Because top managers have a strategic point of view, it may be easy to convince them to buy long-term benefits of the e-commerce system. e-commerce is not a one-time event, nor is it a walk in the park. It requires a solid corporate commitment, with a case for action that is firmly endorsed by senior management (Mougayar, 1997).

All authorities say this commitment and support is critical to success, and empirical evidence backs up this claim (Vollman, et al., 1992, p.410). Before anything else occurs, top management must commit to the e-commerce system implementation. They must confer their dedication and support to see the system implementation through to completion, and must pledge to provide the needed resources to support the effort (McLeod and Smith, 1996). Once this commitment is obtained, the system implementation continues with the selection of executive level authority, referred to as the executive sponsor and the selection of an implementation manager, referred to as a champion (Harrington, 1991).

Top management commitment means a great deal more than a chief executive giving his or her blessing to the new system. The key to commitment is not even providing the necessary funding for the effort. It is first and foremost recognising that the implementation effort will require the sole use of some of the best people in the

organisation for the new system implementation with full authority and responsibility to do the job. Top management commitment also relates to the understanding of how implementation will affect the entire company. Top management should provide leadership for the change, rather than playing a passive role (Vollman, et al., 1992).

Even if not initiated by top management, major changes in business operations due to e-commerce system implementation must be supported actively by this group if they are to be successful. Major changes cause stresses in the organisation. They require more cooperation among functional areas. Top management leadership, vision, support, and active participation are required to reduce the stress levels, ensure that cooperation takes place, and shape the organisation along the lines of the e-commerce implementation strategy.

Therefore, the success or failure of any business effort is often determined by the amount of top management's support. The importance of management support and enthusiasm for business IT success has been documented in early studies (eg. Rockart 1982; Ives et al. 1984). Yap, et al. (1992) and Cragg and King (1993) have identified the level of management involvement and support as a critical success factor of IT. Runge and Early (1988) reported that the role of a product champion is important for the successful implementation of telecommunications solutions.

Management support in IS implementation efforts has been identified in much of the literature as perhaps the most significant contributing factor to the success of an initiative. Top management support is necessary to develop faith throughout the organisation in the project and respect for the implementation team (Hall et al. 1993; Hammer and Stanton, 1994; Hoopes, 1995). Grover et.al. (1995) identified a group of implementation problems regarding management support. Their survey result shows that management support is essential for implementation success.

In this study, management involvement has also been identified as a critical success factor for e-commerce use. Naturally, different companies have established alternative business environments on the Internet, where they can carry out their

usual business and networking activities "virtually".

If an information systems project has the backing and approval of management at various levels, it is more likely to be perceived positively by both users and technical information services (Laudon and Laudon, 1997). Both groups will feel that their participation in the development process will receive higher-level attention, priority, and reward. Management backing also ensures that a project will receive sufficient funding and resources to be successful. Furthermore, all of the changes in work habits and procedures and any organisational realignments associated with a new system depend on management backing to be enforced effectively.

IT/IS/e-commerce managers actively participate in the organisation's planning process with senior managers, and top managers help IT/IS/e-commerce management and line management to overcome the problem of understanding top management's objectives, thus facilitating good communications among management levels. IT/IS/e-commerce managers who participate in the planning process also promote communication or a favourable relationship with top management. Thus, managers would perceive the changing business objectives and help the IT/IS/e-commerce department to achieve the new business objectives.

Top management would acknowledge the importance of IT/IS/e-commerce implementation and generate an appreciation of IT/IS/e-commerce management issues. Top management can better understand the idea or the problems of IT/IS/e-commerce management during the process of e-commerce implementation, and would have a better image of the e-commerce implementation phenomenon.

The business units also have to be aware of the IT/IS implementation phenomenon and inform IT/IS management about their objectives (Bergeron et al. 1993, Ives and Olson 1984). As unit of line management understands more about the IT/IS implementation concept, they are willing to cooperate. IT/IS management also should be prepared to propose a strategic plan of new IT/IS implementation to top and line management. This strategic plan should include the reasons for the change,

its importance to the organisation, the impacts likely to result from it, and the procedure for evaluating it. Ginzberg (1981) indicated that such criteria are important in determining a user's response to an IT/IS change from the strategic plan studied and proposed by the IT/IS manager.

According to Mougayar (1997) and Kalakota (1997) Internet-based e-commerce implementation can impact all corporate functions and have significant impacts on relationships with exchange partners. The single most important factor in assuring successful implementation is clearly communicated support from upper management, preferably the president or CEO. Therefore, top management would commit to and support e-commerce management's objectives and offer cooperation for successful e-commerce implementation. This positive relationship is hypothesised as:

Hypothesis 1: *The commitment and support from top management and users are related to Internet-based e-commerce implementation success.*

4.3 COMMUNICATION, TRAINING, AND FACILITATION OF E-COMMERCE DEPARTMENT AND USERS

Even the management commitment and technical feasibility, Internet-based e-commerce implementation may not achieve the intended goals if people related to the e-commerce system are not ready for it. The Internet has been labelled as probably the most important new tool for today's learning organisation (Mougayar, 1997). According to Mougayar (1997), in order to avoid having Internet technology surpass the ability of management to exploit it effectively, the proper executive education has to formally take place. Because of its newness and complexity, the Internet and e-commerce represent a learning challenge that has to be met with a business education focus. By addressing the management training needs early, one is able to better understand and absorb how to take advantage of the Internet and e-commerce effectively. The best decisions are taken by the most informed managers. Executive education has nothing to do with "surfing the Net," but rather with understanding how it is going to change any organisation. It is a logical step to start

with executive education, since with a greater degree of knowledge, an organisation will be able to better deal with the Internet and any implementation that may follow. Therefore, managers need to be trained to learn how to use the e-commerce system for better decision making, how to manage cultural changes, and how to evaluate the effectiveness of the e-commerce system.

On the other hand users need to be trained to use the e-commerce system properly and efficiently. Employees must be prepared for the changes that will take place by being given information in advance and by receiving training. Communications should inform all personnel of planning and explain why they are necessary. The goals are to gain support for the changes, and to involve employees in the change process due to implementation of the e-commerce system. Users must learn general concepts of the e-commerce system such as opportunities and advantages, and also threats, such as security issues.

Further, before an organisation can move to a change - following organisational change theory - according to Lewin's three-stage model of system change, there will be unfreezing, change and refreeze stages (Lewin, 1947; Davis, 1985; Tait and Vessey 1988). During this "unfreezing" stage, the perceptivity of the organisation to a possible change should be increased; otherwise, the change stage cannot possibly be reached. According to Ginzberg (1981), user participation in system design and implementation will aid in accomplishing unfreezing, and is a method to increase the receptivity to change. Before implementation, the IS/e-commerce department could help users obtain education, knowledge and training and skills for the new Internet-based e-commerce system. Such user awareness should increase user receptivity.

Before or during the process of implementation, the IS/e-commerce department could provide training courses, provide hardware and software for users to learn and use, help to set the standards for hardware and software, improve communication and assist users in communication and allied efforts. Thus users would have less fear and their attitude toward implementation could be favourable (Rainer et al. 1992). Clearly communicating realistic expectations with the staff and users is one of the

critical success factors of an information system implementation on the Internet. A system is not complete until it is fully accepted by the user community.

Thorough user training is crucial to implementing an information system successfully, Turban, McLean and Wetherbe, (1996) states that user training requirements for a new information system can be categorised as either *clerical* or *managerial.* Clerical users must be instructed in how to process transactions. Managers must be informed as to the format and content of reports and work-station displays, as well as how to request reports or make online enquires. Managers also need to understand how programmed decisions are made and how to use any decision-support capabilities. Turban, McLean and Wetherbe, (1996) also states that it is usually advantageous to have representatives from the different departments participate in developing user documentation (eg. user procedures manuals) and in actually training users on the system.

In the environment of Internet-based e-commerce system implementation, coordination of corporate or business departments is more crucial and complex than in the traditional IS computing environment, because e-commerce systems will change entirely a company's traditional business processes (Mougayar, 1997).

Further, world-class performance demands that the firm leads the changes-making competitors play "catch-up ball." This requires extensive education. Key users need to communicate with customers, vendors, business partners, other professionals in e-commerce, and major players in the company - those who shape the firm's competitive posture. Therefore users require much more than the technical skills needed for system use. These skills require professional education, usually a combination of formal education and significant in-house education too. Users need job rotations to understand key functional areas as well as business practices and systems in each area. Users also need training in how best to communicate with people outside the firm, raise the right questions, sort information, and provide concrete action proposals that fit the company's particular culture.

As a result, communication is a critical success factor in the Internet-based e-commerce system implementation. Therefore, this study hypothesise a positive relationship between e-commerce implementation success and the importance of communication between users and the e-commerce department.

Hypothesis 2: *Communication between users and the e-commerce department is related to Internet-based e-commerce implementation success.*

The coordination functions of IS/e-commerce departments often cause conflict. The conflicts and uncertainties inherent in any implementation effort will be magnified when an implementation project is poorly managed and organised. Under poor management basic elements of success may be omitted. Training to ensure that end users are comfortable with the new system and fully understand its potential uses is often sacrificed in part because the budget is strained toward the end of a project.

A systems development project without proper management will most likely suffer vast cost overrun, major time slip-pages, and technical performances that fall significantly below the estimated level (Laudon and Laudon, 1997). On average, private-sector projects are underestimated by one-half in terms of budget and time required delivering the complete system promised in the system plan. A very large number of projects are delivered with missing functionality (promised for delivery in later versions). Government projects suffer about the same failure level, sometimes worse (Laudon, 1989).

The IS/e-commerce department can provide training courses and services to users to promote Internet e-commerce implementation. Technical training is important to the users by providing them tools, techniques and documents so that e-commerce system can be used more easily. As in the case with any information system, people with special skills are needed to implement and use an e-commerce system solution.

Many information systems failures have their origins in discounting or underestimating the degree of IT/IS skills and capabilities needed within the entire

company to successfully implement a new system. Therefore user training is essential to the effective use of implemented systems (Callon, 1996). Employees must be provided with two types of skills: skills to participate in the implementation process and skills to do the new jobs after the implementation is made.

Through the function of coordination and communication, users can understand the functions of IS/e-commerce services and support. IS/e-commerce department can be made aware of users' needs and provide required facilitation to users during and after e-commerce implementation. As an example, e-commerce department can acquire the e-commerce system software solutions to set up an Internet-based Web-centric network environment. Therefore, this research examines the relationship between the training and facilitation to users and Internet-based e-commerce implementation success.

Hypothesis 2a: *Training and facilitation to users is related to Internet-based e-commerce implementation success.*

4.4 USER APPRECIATION OF E-COMMERCE IMPLEMENTATION

According to Ruth and Schware (1996), for many years, it has been known that successful introduction of any new idea, whether technology-related or not, requires a careful elaboration of the strategy by inducing the users to participate in the idea. Although the strategies vary according to the situation, a common requirement is aligning the user's behaviour patterns with the use of the intended new technology (like Internet and e-commerce). A determined, careful focus on the end-user's behaviour is at the hart of a successful technology transfer application.

On the other hand, user appreciation is one frequently cited factor to overcome IS implementation failure, because it may gain user commitment, avoid resistance and ensure that user requirements are meet. The importance of user appreciation in IS success has been studied extensively (eg. Barki and Hartwick, 1994; Cavaye, 1995). User appreciation consists of a group of factors about user involvement and users'

positive attitudes toward Internet-based e-commerce system implementation. User appreciation measures the relationship between users' behaviour and Internet-based e-commerce implementation success. That is why, the research proposes a positive relationship between user appreciation and Internet-based e-commerce implementation success.

Hypothesis 3: *User appreciation is positively related to Internet-based e-commerce implementation success.*

User involvement in information systems implementation is believed to be critical in the success of such systems (Cavaye, 1995; Barki and Hartwick, 1994; Baroudi, et al., 1986; Ives and Olson, 1984; Tait and Vessey, 1988). Several previous studies have reached varying conclusions.

Schewe (1976) found no relationship between user involvement and his/her attitude toward the system. However, some other studies found that user involvement was positively correlate with user satisfaction (ie., Montazemi, 1988; Baroudi et al., 1986).

A study by Ives and Olson (1984) reviewed 22 IT/IS related empirical studies published from 1959-1981. Only 8 (36%) studies claimed a positive relationship between user involvement and system success, 7 studies claimed a negative relationship, and the other 7 studies claimed mixed results. Of the 7 studies that investigated the relationship between user involvement and user's attitude toward the system, only one study reported significant results with user involvement and users' attitude.

Cavaye's (1995) review also indicated that only 7 (37%) of 19 empirical studies carried out between 1982 and 1992 show a positive involvement-success link. The findings from those two reviews (Cavaye, 1995; and Ives and Olson, 1984) are remarkably similar, despite the intervening eleven years. However, some other studies as reviewed in Chapter 3 presented quite different results. Therefore, this

research examines the relationship of these two variables (user involvement and users' attitude) and Internet-based e-commerce implementation success.

Two hypotheses related to user appreciation of Internet-based e-commerce implementation will be examined. This study is based on the assumption that there is a positive relationship between user involvement in the e-commerce system implementation and system success, and assumes a positive relationship between users' attitude toward e-commerce system and Internet-based e-commerce implementation success.

According to Olson and Ives (1981), a member or members of the target user group define user involvement. Ives and Olson (1984) classify the extent of user involvement as follows:

- *No involvement.* Users are unwilling or not invited to participate.
- *Symbolic involvement.* User input is requested but ignored.
- *Involvement by advice.* Advice is solicited through interviews or questionnaires.
- *Involvement by weak control.* Users have "Sign-off" responsibility at each stage of the system development process.
- *Involvement by doing.* A user is a design team member, or is the official "liaison" with the information systems development group.
- *Involvement by strong control.* User's overall organisational performance evaluation depends on the outcome of the development effort.

Further, Ginzberg (1981) suggested that gaining management and user commitment to the project and gaining user commitment to any changes necessitated by the new system will increase the probability of successful implementation of IT/IS. Ives and Olson (1984) also suggested that user involvement effects system success. Therefore, it is expected that the extent of user involvement and success on Internet-based e-commerce implementation are positively related as follows:

Hypothesis 3a: *User involvement in the process of e-commerce implementation is positively related to e-commerce success.*

Furthermore, Davis and Olson (1985) argued that "implementation of information systems is a process of organisational changes; implementation refers to the ongoing process of preparing the organisation for the new system and introducing it in such a way as to assure its successful use."

On the other hand, Lucas (1981) suggested that human factors affect the successful implementation of a new IT/IS more obviously than do organisational factors. If users do not realise that the organisation is going to adopt new IT/IS, and their attitudes toward IT/IS implementation are unfavourable, then it is likely that they will not accept the implemented IT/IS. Thus, the risk of IT/IS implementation failure will be increased. Users may even resist the changes involved in IT/IS implementation. User resistance could be a serious problem during the IT/IS implementation process. The research hypothesises a positive relationship between users' attitude toward Internet-based e-commerce system and e-commerce implementation success.

Hypothesis 3b: *Users' positive attitude toward e-commerce is positively related to e-commerce implementation success.*

4.5 E-COMMERCE DEPARTMENT'S SERVICE FUNCTION

From the e-commerce department's service function perspective, the important keys to Internet-based e-commerce implementation success are training (ie. how to use Internet/e-commerce system tools), providing useful services (ie. services organisation's staff needs and wants); and enabling tools (ie. providing information access tools to the customers).

According to Mougayar (1997), it is also important to treat the customer service area as critical. E-commerce systems must permit clients to receive instantaneous and

efficient customer support on line, including statements about their own transaction history and efficient response to their online queries. Customer self-service is an increasing trend that is gaining momentum through Internet-mediated interactions.

By offering customers an array of choices, added convenience and control, companies are saving costs by off-loading the initial duties of customer interactions to the customers themselves. Customers want information that resides in large corporations legacy systems, so companies have to make it available to them via the Internet. Once users are used to the new online connection with their suppliers, they will begin to expect more transaction history and instantaneous support to occur on the Internet. Organisations building a new channel over the Internet must take into account this capability. It is important to treat customer service as a top priority, and to build the interface requirement to allow customers to receive instantaneous and efficient support on line. An evolution to the customer service concept could be:

- Frequently asked questions (FAQs).
- Send e-mail for support.
- Product updates and software available on line.
- Instantaneous online chats possible with a customer representative.
- "Click here" for a live connection to customer support (so, this is like going full circle, back to the human interaction model).

By giving the customers self-access to their accounts, transactions, orders, etc., companies are providing them valuable information in a more timely and accurate manner. The level of satisfaction for those customers interacting electronically with any company will undoubtedly rise.

Moreover, according to Mougayar (1997), companies must constantly and very directly inform their customers and electronic partners about how to interact with them in this new marketplace. It is not just enough to give out the Web site URL address any more. Companies have to specifically explain and show them the benefits and advantages of using all Internet avenues and features, including, but not

limited to, their Web site. One of the major challenges facing organisations will be to attract and retain electronic partners and customers.

The main function of an e-commerce department is to manage e-commerce resources and to coordinate and facilitate online functioning for users. An effective e-commerce department provides sufficient and necessary hardware devices, supports applicable and efficient software, and has a competent staff that supports certain services. Services such as technical support, trouble shooting, consulting and training are critical for an e-commerce department.

According to Mougayar (1997), employees' and managers' education is the key for successful implementation of Internet-based e-commerce. When all levels employees and managers are well educated about e-commerce, they will each begin to discover their own business opportunities. Any implementation becomes much easier if it understood that the pain of not doing anything is greater than the pain of doing something about it. Visualisation will help companies explain the strategy and the vision. Action starts to happen when a large number of employees and managers begin to internalise the key concepts and issues that affect them directly. Companies can test various aspects of this transition by asking employees how the Internet is affecting their jobs, and interaction with customers and other trading partners.

Employee training, and the need to constantly learn and retool skills can have tremendous repercussions on employee morale and productivity for Internet-based e-commerce implementation success (Prakash, 1996; and Laudon and Laudon, 1997). Just as nearly all employees are both consumers and producers of information in traditional media formats, the same holds true for electronic formats. It is everyone's responsibility to both use and contribute to an organisation's information space. In their study, Magal and Carr (1988) also found an IT/IS staff's understanding of the users' business and problems plus standardised hardware and software to be important factors for the quality of IT/IS support services. Therefore, this study proposes a positive relationship between Internet-based e-commerce implementation success and the support services of the e-commerce department.

Hypothesis 4: *The quality of support services of an e-commerce department is positively related to Internet-based e-commerce implementation success.*

4.6 INTERNET/E-COMMERCE SYSTEM INTEGRATION WITH ORGANISATION'S EXISTING BUSINESS FUNCTIONS

Internet-based e-commerce is about putting all the pieces together - internal and external business processes and management. Although the Web is a good start for conducting business on the Internet, it is not the final step of the solution. If an organisation's business is planning to incorporate Internet-based access to legacy data, and integrate it with business practices such as work-flow or order-fulfillment running on internal networks, then the organisation will has to consider more than just setting up a Web server and CGI scripts to handle database access and distribution of the data on organisation's Intranet (Kosiur, 1997).

The goal - what e-commerce really means for business - is the integration of processes that span companies, geography, and business functions (Keen and Ballance, 1997). For virtual and traditional companies alike, the successful implementation of e-commerce depends on the ability of integrating internal e-commerce business operations with suppliers, business partners, distributors and loyal customers all along the supply chain. For companies, integrating e-commerce system with supply chains is a critical part of realising full benefits of e-commerce.

According to Copeland and Hwang (1997), the organisation that builds the full-service Intranet as organisational infrastructure today will have a solid foundation for E-commerce tomorrow. All of the projected flow of business information and data across the Internet needs to be used electronically once it reaches the organisation. In order to get maximum benefit, company Web site information must be integrated with its corporate systems, such as customer databases, product inventories, and payment functions. Therefore, the integration of Internet-based e-commerce into the other business functions is one of the most important factors for the organisation's e-

commerce system implementation success (Carayannis, 1997; Keen and Balance, 1997). Care should be taken to integrate, as far as possible, legacy applications within e-commerce initiatives.

E-commerce integration is the process during which a firm alters its business practices and applications so that they interface with E-commerce applications. *Internal integration* refers to the variety of applications interconnected through e-commerce, such as order-entry, invoicing, billing, and payment transfer, and *external integration* refers to the number of trading partners, such as suppliers, customers, governmental units, and financial institutions with which the firm can transact business through e-commerce.

Mougayar (1997) expressed that in developing an Internet commerce platform, one must think about the role of Intranets. The richness of Intranet corporate applications positively impacts e-commerce capabilities. Intranets are the "stamina" of Internet commerce. Extending Intranet applications into the Internet permits an organisation to provide more values to customers in several ways:

- Real-time access to information.
- Ability to perform business transactions.
- Developing new relationships.

The seamless integration of Intranets with the Internet is a new phenomenon, which represents an advanced evolution of an Intranet strategy. This Intranet to Intranet evolution could be referred to as "*Inter-Intranet or "Extranet.*" Extranet applications communications becomes a necessity for engaging trading partners in e-commerce. Extranet development is not only tied to integrating the technology, it relates to linking and integrating business-to-business applications, such as placing and processing orders, co-ordinating shipping logistics, funds transfer, bidding, brokering and other procurement services. Integration can only be addressed by implementing both the Internet and the Intranet as if they were one seamless process. This allows

the business process to travel inside the Intranet, outside onto the Internet and then back into another Intranet.

The e-commerce integration level presumably determines the level of benefits received due to e-commerce. Usually, non-integrated e-commerce systems will offer users direct benefits only, such as reduced transaction costs and higher information quality. For example, if an organisation has stand-alone systems, it cannot fully reduce the costs of processing and errors caused by re-keying. Information needs to be re-keyed into another computer after the document is printed from the stand-alone system. Integrated systems, on the other hand, will offer both high direct benefits and the ability to take advantage of indirect benefits, such as increased operational efficiency, better customer service, and improved inter-firm relationships. Therefore, if the e-commerce systems are fully integrated into an organisation, the level of benefits from the system will be very high. (eg., e-commerce systems fully integrated into JIT systems).

Integration has become the watchword of business use of information technology in the 1990s: integrated financial software, integrated customer databases, integrated logistics are some of them. The various surveys show that the successful integration of the business processes driving supply chain management and logistics systems, realising significant efficiency gains as a result. This involves organising the firm's planning, operations, organisation, and information around processes, not around functions and departments. It includes managing the supply chain and day-to-day transactions. According to Rockart and Short (1989), firms attempt between-function integration in order to increase their capacity to respond quickly and effectively to market forces; to improve the quality of conformance to customer requirements; or to reduce costs.

The growing focus on business processes, teams, and customer services are the building blocks of new organisational forms demanded integration of systems. Like a puzzle, e-commerce is ultimately about putting all the pieces together – electronic data interchange, electronic money management, and the supporting

telecommunications, information management, and other technical tools. The goal - what e-commerce really means for business - is the integration of processes that span companies, geography, and business functions rather than putting a simple Web site on the Internet (Keen and Balance, 1997; Mougayar, 1997).

Iacovou, et al., (1995); Swatman et al., (1994); and Bergeron and Raymond (1992) found that integration, both internally (ie., internal business processes and communications) and externally (ie., with suppliers, vendors, business partners, competitors, customers), is a determining factor in achieving strategic benefits from EDI. However, when the e-commerce integration level is decided, the technical competence should be evaluated, because it has direct influence in the organisation's ability to implement, maintain and utilise an e-commerce system, and if the potential competitors and business partners can use it. Organisational and technical factors like skills of personnel, internal training, work procedures and routines, work-load and process flexibility show the technical competence of an organisation, and could predict the e-commerce utility for the organisation.

Venkatraman's (1990) IT-induced business transformation model shows that systems integration usually starts with internal applications. This is followed by inter-organisational, and finally, sector-wide transformation. Sanders (1992) stated that, internal integration of EDI reflects the variety of the value chain functions (order processing, shipments, inventory, etc.) interconnected through EDI within the organisation. For instance, if a customer sends in a purchase order using e-mail, the firm should be able to process it electronically rather than manually. Economies of scale, improved production cycle and decreased transaction time are among the possible advantages of integrating a greater number of activities within the firm's value chain. This can also be true for quality improvements and inventory reduction (Kekre and Mukhopadhay, 1992). Therefore, system integration between the Internet e-commerce and firm's internal systems is very important.

Zaheer and Venkatraman (1994) expressed that external integration refers to the variety of the trading partners (ie., clients, suppliers, business partners, distributors,

etc.) with which the organisation interacts through EDI. The integration of EDI with all types of upstream and downstream partners is also considered important (Mackay, 1992). Increased external links allow the firm to capitalise on the investment made in EDI. Higher potential rewards can be obtained by firms implementing strategic applications (such as e-commerce) with an outward rather than an inward orientation (Bergeron, Buteau, and Raymond, 1991).

After the introduction of e-commerce systems, the first task is to redefine some processes, so that these systems become fully integrated in the way an organisation does business. For example; the logistics process (the back-end) need to be integrated with the online ordering systems (the front-end) to provide uniform and seamless service. There is little use for an online system if orders have to be manually re-keyed into another system before they can be processed. This often requires integration with legacy information systems. The other way of aligning processes and technology is to use the latter to enable a redesign of the processes, thereby reducing the cost, time, and number of errors associated with the process, while increasing the service level. This is often the focus of business process re-engineering methodologies (Davenport, 1993).

When information technology and processes become fully integrated, one can see the emergence of new business models for companies, "digital companies," ie., fully integrated organisations fully relying on information technology both customer interaction and internal management. The *Internet Shopping Network* is an example of such companies, where order taking, inventory and order management, as well as financial systems, are all tightly integrated (Bloch, 1996). Therefore, even though e-commerce makes sense theoretically for a myriad of business activities, the reality is that it has to integrate with internal (Intranet) and external processes (Extranet) that are already in place (Mougayar, 1997).

The primary goal of Intranets/Extranets should be to forge closer relationships with suppliers and internal and external customers. Intranets are far more than mere LAN (Local Area Network) extensions, and it is important for e-commerce managers to

understand the differences. They require the integration of complex, multi-platform solutions into a secure yet flexible environment.

Integration means more than coming together externally. Internal integration is vital, indeed, even more vital, than linking with the outside. In an internally integrated organisation, incoming orders are received electronically and the information goes not only to production, but also to shipping, billing, and inventory systems automatically - without any human intervention. Internal integration also means critical data is stored digitally in a format and on media that permit instantaneous retrieval and electronic transmission.

While technology is important to integration, human resources are indispensable. E-commerce principles require co-workers, customers, and even former competitors to work together to solve problems, improve services, innovate new products, and pursue new markets. One should keep in mind that technology is the servant and human intelligence is the master of e-commerce.

The real business benefit of e-commerce will come when a company integrates its Web presence with its corporate or legacy data, and uses this as the basis for doing business. For example, many Web sites spend enormous resources in their e-commerce Web site presentation and order-taking procedures, but this increases processing and administration costs because the orders must be keyed into their offline internal systems. Integrating orders electronically from an e-commerce Web site to the internal system should be mandatory in order to reduce operational costs and improve efficiencies. This automation should be implemented as part of an e-commerce Web presence as it will allow an organisation to capitalise on the global 24 hours a day seven days a week opportunities for order procurement and processing via the Internet.

This integration of corporate data into usage of the Internet, Groupware and e-commerce is a step of fundamental importance to all businesses that are looking for ways to stay ahead and get maximum benefit from the e-commerce. Companies must

also integrate their core business data into a network computing model (Walker, 1997).

E-commerce integration is sometimes a challenge linked to a major re-engineering exercise accompanied by resistance to change. This is a threat, but also an opportunity waiting for a positive outcome. Moreover, since e-commerce implementation is in many cases evolutionary, organisations can take the time to slowly to change the business process as demand increases. For large companies, doing business electronically is not an option, it's a requirement. But the success of any e-commerce implementation hinges on getting all trading partners on board, from the largest to the smallest.

Therefore, organisations are realising the critical contribution being made by their extended enterprise (eg., customers, suppliers shipping agents, etc.) in being able to achieve identified business goals. At a practical level, this requires close integration of business processes between the parties, typically supported by sound business practices such as EDI. For instance, a major retailer may well be extremely effective in its own operation, but without an efficient supply chain that closely integrates its suppliers with its own internal business processes, competitive advantages will be lost.

According to Neuman and Medvinsky (1997), applications must be modified to use the electronic payment infrastructure in order to make a payment service available to users. The ability to process real-time payments is critical to any Internet-based e-commerce system's Web site. It is therefore very important to have an infrastructure that allows the purchase cycle to be completed when the buyer is ready to make the decision. Ideally, a common Application Programming Interface (API) should be used so that the integration is not specific to one kind of payment instrument. Support for payment should be integrated into request-response protocols on which applications are built so that a basic level of service is available to higher level applications without significant modification. Successful e-commerce system's Web sites must be developed in such a way that, secure and reliable of payment processes

must be ensured, and that real-time authorisation can be provided. The research hypothesises a positive relationship between e-commerce integration with existing business functions and Internet-based e-commerce implementation success.

Hypothesis 5: *E-commerce system integration with existing business functions is positively related to Internet-based e-commerce implementation success.*

4.7 ORGANISATIONAL EFFECTIVENESS FOR E-COMMERCE SYSTEM

Organisations need to be absolutely clear on their objectives for an Internet-based e-commerce system implementation project. Therefore, any management task should be designed to achieve the organisation's objectives. Similarly, Internet-based e-commerce implementation should be designed to achieve an organisation's objectives. Bloch et al., (1996) stated that building any kind of e-commerce system requires a strategy and vision of the goal to achieve.

As a new business medium and sales channel, a successful e-commerce business must be treated with the same rules, policies and strategies as any physical one. Without an appropriate strategy, having a Web site on the Internet does not automatically make a company a success, nor does it make customers appear. Success in Internet-based e-commerce does not has to do with a company's Web site only, but more importantly it will depend upon how a company strategically positions its products and services via other Internet-based e-commerce communities and intermediaries, as well as how a company facilitates its interactions with customers, suppliers and business partners.

According to Mougayar (1997), by tackling individual elements of e-commerce without a comprehensive e-commerce strategy, organisations may never realise its synergistic potential. A planned strategic approach is needed, including:

- A clear view on how an organisation will use the e-commerce and its marketplace. Since the e-channel is destined to become the primary vehicle to conduct business in the future, companies must learn how to attract and engage customers in it, take orders and payments, distribute product and services and support their customers in this new business environment.

- An ability to transform internal and external business processes according to the requirements imposed by the new types of electronic interactions. Intranets might be on example of how to keep up with the external speed of Internet information dissemination.

- An organisational framework led by a senior level person whose role is to develop overall Internet commerce strategy, coach the senior executives to initiate call for actions, and educate employees throughout the organisation.

Full strategic exploitation of the Internet depends on the appropriate organisational infrastructure and its effectiveness (Prakash, 1996). For instance, if IT/IS implementation can improve an organisation's effectiveness by data integration, then it will result in a higher quality of work and better business decisions by the end-users. This leads to IT/IS system implementation success.

From an organisational point of view, the implementation of an e-commerce environment is closely coupled to radical changes in the way business is conducted, as well as a broadening of the scope of business activities. In consequence e-commerce impacts multiple business processes over time and heavily relies upon IT for execution, due primarily to functional requirements, cost benefits, and simply the pervasiveness of IT. Such a program usually forms part of a top management vision for the organisation and the setting of ambitious goals, together with an acceptance that radical changes will be necessary to achieve them. This implies a major re-distribution of internal resources requiring cross-functional teaming and fundamental impact to all stake-holders including internal functions, trading partners and customers.

In the process of developing new business theories and strategies, managers must consider what kind of tactics and strategy to adopt. Managers also need to consider the immediate impact of Internet-based e-commerce on key business areas such as management of sales and distribution channels, pricing policy, convergence of products and services, entrepreneurship, and managing new consumer interfaces. (Kalakota and Whinston, 1996).

Along with specifying long-term and short-term strategy, firms need to examine how e-commerce will change fundamental business processes. For instance, banking professionals need to determine how wide-spread home banking, as well as the use of new forms of financial instruments (such as digital cash), will change existing banking processes. In order to avoid some pitfalls, Mougayar (1997) recommend assessing the following eight steps, and acting on perfecting the outcome of each one, in order to maximise the chances of success:

1. Conduct necessary executive education,
2. Review current distribution and supply chain models,
3. Understand what your customers and partners expect from the Internet,
4. Re-evaluate the nature of your products and services,
5. Evaluate internal human resources and capabilities,
6. Perform a competitive analysis,
7. Develop a Web-centric marketing strategy, and
8. Assess the impact of new intermediaries.

According to Guptill (1997), Gartner Group set out a very detailed survey in 1995-96 to research what enterprises were actually doing regarding e-commerce. The report found that enterprises recognise the opportunities in establishing or joining the e-commerce marketplace, but they do not understand what will be required in terms of planning, budgeting or any other critical factors for success because of the newness of the concept and lack of a theoretical base. Report found that, because of the lack of understanding, the lack of organisational support, the lack of budgets, and other

factors, the majority of enterprise e-commerce implementation efforts will fail through 2000 (0.9 probability). The failures will include:

- Lost resources spent on Web and other presences that have no clear function or mission.
- E-commerce revenues lost to competitors that are able to build and implement E-Commerce strategies.
- Overall market share lost to those competitors.
- Opportunities lost (plus higher operating costs) in other areas due to overspending and misallocation of IT resources.

The report outlined some important preventive actions including:

- ✓ Building a solid e-commerce organisation with clear responsibilities and budget authority,
- ✓ Better auditing and accounting for IT resources, including e-commerce projects,
- ✓ A move away from project-focused e-commerce efforts to integrating e-commerce technologies with ongoing business processes, and so establishing a solid e-commerce set of channels.
- ✓ Coordination of e-commerce efforts between business unit managers, line managers, IT managers, and all relevant vendors and providers, integrating their processes with relevant, useful technologies (ie., learn from the developers and process managers how best to make things work within the enterprise structure) to attain e-commerce goals will succeed at a rate of 10-to-1 over enterprises that do not integrate their processes with the technologies (0.7 probability).

E-commerce systems cannot succeed on their own, and are usually accompanied by fundamental changes in the way in which the business operations are run. IS/e-commerce department should provide a supporting environment for top managers for their decision-making. For example; it is important to be able to describe e-commerce project outcomes in terms of attracting top management's commitment, such as: order to remittance time reduced from 10 days to 1 hours; stocks and work-

in-process slashed by 60%; customer service improvement up seven points on the index, etc. Management must set the agenda, determine the goals, and ensure they are aggressive but realistic. A long-term and successful e-commerce business is dependent upon a solid commitment to setting corporate objectives, and clearly defined online business plan.

Therefore, organisational commitment and effectiveness is necessary to successfully run an e- commerce system (Bloch et al. 1996). Organisations must look towards developing effective organisational e-commerce strategies that direct e-commerce usage towards the integration and alignment of organisational business processes with business objectives and towards the attainment and maximisation of added business value (Bloch et al. 1996; Cockburn and Wilson, 1996; Cronin et al., 1994; Cronin, 1994 and 1996; Quelch and Klein, 1996; Dahl and Lesnick, 1996).

On the other hand, organisational effectiveness requires understanding customers and what they do with the product or service, how they obtain value from it, and the problems they may encounter in gaining that value (Ward and Griffiths, 1997).

Therefore, a sustained presence in cyberspace requires a strong organisational commitment and effectiveness, to increase the resources devoted to it as success proves the validity of the business model. This should be, of course, be compensated by increased financial revenues, justifying the additional costs.

Thus, this research examines the relationship between organisational effectiveness and Internet-based e-commerce implementation success:

Hypothesis 6: *The quality of organisational effectiveness is positively related to Internet-based e-commerce implementation success.*

4.8 CHANGE MANAGEMENT (MANAGING TECHNOLOGICAL AND ORGANISATIONAL CHANGE)

Implementation of Internet-based e-commerce is not simply a technology project. It changes current business processes and practices, and usually requires significant organisational changes. Internet-based e-commerce represents a once-in-a-lifetime opportunity for CEOs (Chief Executive Officers) to re-structure their organisations to take advantage of the fundamental change imposed on them for conducting business with partners, suppliers and customers. Along with changes in organisational structure come changes in the company's communications and information infrastructures. One of the biggest challenges for companies when implementing e-commerce is managing these organisational changes (Kosiur, 1997).

In many cases, crucial organisational changes revolve around the treatment of information and communications. It is fundamental to maintaining a flexible organisation that can respond quickly to changes and new opportunities. Along with these communications and information infrastructures comes the need for management of the knowledge this information generates. But the increase in the quantity of information in general, and the sharing of information makes knowledge management even more important. Without it companies and their employees will be unable to find and take advantage of numerous opportunities, and they may well collapse under a glut of information with which they are ill-equipped to deal.

The introduction of a new business solution is an organisational change that affects the way various individuals and groups perform and interact in the firm. Different groups and individuals in organisations have varying objectives, goals, and levels of power. People typically resist new business procedures, job relationships, and technologies because they are uncertain of how they will be affected. A very well designed solution may not work unless it is carefully planned and prepared for. The process of planning change in an organisation so that it is designed and implemented in an orderly and controlled manner is called change management. The design of any business solution needs to take change management into account.

According to Harrington and Reed (1996), only a transformed, revitalised organisation will be able compete successfully in a dynamic marketplace, and an established company's key to success in the years ahead will be to leverage its franchise into the electronic marketplace. However, this won't be easy because for most incumbents "e-commerce will require broad changes in organisational approach and structure, as well as in skills, mindset, human resources, and measures of economic success.

Many organisations will have to cannibalise existing businesses or channels and risk de-motivating the traditional organisation while building the new one," (Harrington and Reed, 1996). Companies that succeed in establishing innovative units will have to be careful not to stifle the venture by trying to convert it back into a traditional model in the longer term. Harrington and Reed states that "long-term strategic plans relying on elaborate management processes are unlikely to prevail against nimble new entrants unencumbered by past decisions."

Internet and e-commerce technology alone will not solve the organisational issues or make benefits. Revamping business processes to accommodate many of the new opportunities offered by e-commerce is a continual task. There will always be technological changes on the Internet, as well as changes expected by the customers in a continuously evolving marketplace.

Therefore, e-commerce implementations require a fresh perspective on the function of an application, the role of the user, and the use of development tools themselves (Kalakota & Whinston, 1996). As important as it is to learn and implement new technology, firms should start to adjust organisational structures to meet the demands of e-commerce (Brandel, 1996). Internet-based e-commerce system needs to be integrated in an organisation, with the change management issues linked to people resisting new concepts and ideas. It also needs to support a clearly defined and well-communicated business strategy (Bloch et al. 1996).

E-commerce system projects impact existing processes and must overcome both those that have a real or perceived interest in existing processes as well as the inertia of human nature. The key to mitigating the resistance to implementing projects is to involve all stakeholders of the existing process early in the planning and development of the information technology project (Moreton, 1995).

The implementation process demands organisational change. Incorporating e-commerce into business will require some changes. Managing change is very important because almost anything a business does to benefit from e-commerce is going to involve some type of alteration. The change might be something as simple as improving a process by doing it electronically instead of manually. But embracing the virtual value chain as a way of doing things, or extracting maximum value from the marketplace, requires more - usually a transformation of a business, or its redefinition (Kosiur, 1997).

E-commerce can and will impact organisational structures because, the organisational structures must grant companies the flexibility needed to do business in response to market requirements (Kalakota & Whinston, 1996). Firms need to ask themselves how best to design and implement new organisational structures, how to measure the performance of these new organisational structures, how to incorporate new innovations like mobile computing and software agents into business process design. The first step in organisational change is for the leader to share his/her vision with the troops (Hills, 1997). Internet technology (ie. Intranet) facilitates this communication directly to everyone so that it does not become garbled along the way. This helps develop the shared vision and commitment necessary to propel the organisation forward.

According to Kalakota & Whinston (1996), one of the immediate effects of technology on organisational structure can be seen in advertising and marketing communications departments that are being revolutionised by Internet Web-based publishing. For example, Xerox Corp. has over 300 employees from several departments involved in maintaining the quality and consistency of Xerox Web

pages. Therefore, companies need to determine the right organisational structure for managing large-scale Web efforts for business operations purposes.

Changes in an organisation will affect the people around it. Such change may be resisted because different users may be affected by the system in different ways. While some users may welcome a new system because it brings changes they perceive as beneficial to them, others may resist these changes because they believe the shifts are detrimental to their interests (Joshi, 1991). Change management literature illustrates that past attempts to change are important to consider when planning new changes. Historical successes and failures can have positive and negative effects, and intrinsically have an impact on the culture within an organisation or industry.

According to Burnes (1996) and Dawson (1996), if the proposed changes contradict the existing culture, implementation is considerably difficult. Key to successful transformation of any kind is a commitment from the workforce and a successful change in organisational culture. Changing culture is a difficult and innovative process. Culture is a living thing within an environment, continually evolving and changing. It is difficult to manage, but can be influenced by the structures and philosophies emerging from senior management.

Grover et al. (1995) stressed that change management issues emerged as the set of problems with the most significant negative relationship with the project implementation outcome. One of the methods suggested for mitigating the resistance to change is the communication of the vision behind the impending change. It is suggested in much of the literature (Hall et. al., 1993; Stoddard and Jarvenpaa, 1995; and Grint et. al., 1996), that the reasons and expectations for the change should be communicated organisation-wide as a way of motivating people and enciting them to commit themselves to the system implementation. According to Romney (1996), involving the entire organisation in the process is a good way to overcome lethargy and resistance within the organisation.

Following the introduction of e-commerce, the changes will occur in technology, structure, and culture of the organisation. Technological changes that are likely occurred in the organisation while implementing of e-commerce. In that case, management needs to work for resources of the organisation. In the structural changes management may need to improve the process. In the cultural change management could consider the employees of the organisation. Human behaviour finds it difficult to adjust to change. An organisational culture that takes advantage of the trust and respect of the users for integrity and professionalism is likely to implement and benefit from a system like e-commerce. Mutual trusts among executives, management personnel and knowledge workers are a necessity and have to be nurtured over a period of time in an IS/IT environment.

One of the classic examples of change management in this century has been the advent of automation, IT and then the Internet. If automation saved the organisation costs of 10% then IT saved the organisation costs by more than 20%. Experts predict that the Internet-based e-commerce will save even more.

Human resources issues also need consideration when an organisation undergoes change (Hall et al., 1993; Hammer and Champy, 1993; Romny, 1994). Incentive and reward structures, new skills training, and other human resources policies may require alteration in response to the organisational restructuring. It is important that this is addressed if management wishes to cultivate the values required for e-commerce implementation.

According to experts, change is not 'natural' in business. That is handy for consultants, since it justifies extensive (and expensive) programs to impose change on resistant organisations and their inhabitants. Excellent management is naturally about recognising, reflecting and leading change.

According to Laudon and Laudon (1997), strategies to overcome user resistance to change include user participation (to elicit commitment as well as to improve design), user education and training, management coercion (edicts, policies), and user incentives. User resistance can be addressed through changes to the new system,

such as improved human factors (user/system interface). Finally, users will be more cooperative if organisational problems are solved prior to introducing the new system (Laudon and Laudon, 1997).

So, how can the change process be managed? In addition to determining people, organisation, and technological factors that cause problems, one must determine the people, organisation, and technology impacts of proposed solutions. Encouraging effected parties to participate in the development of a particular solution can make people more committed to realising the solution, reducing their fears of change as well. People are more likely to accept a solution if they have had proper training and if the solution is supported by top management. Individuals involved in developing solutions can act as change agents, working to win acceptance to their solutions among all parties involved.

If an organisation has successfully established an atmosphere that encourage innovation and team work, new business solutions will be mush easier to implement (Markus, and Benjamin, 1997). Therefore, this study proposes a positive relationship between change management and Internet-based e-commerce implementation success.

Hypothesis 7: *The quality of change management is positively related to successful implementation of Internet-based e-commerce.*

4.9 INTERNET/E-COMMERCE SYSTEM SECURITY AND RELIABILITY

Internet security, privacy and reliability are of growing importance to businesses and consumers as well as nations (McKnight and Bailey, 1997). Internet security has often been recognised as an inhibitor to the growth of business on the Internet (Bernstein, 1996; Dahl and Leslie, 1996; and Ahuja, 1997).

Research shows that network, data/message, Internet, e-commerce and Web application securities are some of the most challenging factors faced by companies

which wish to implement Internet-based e-commerce (Kalakota and Whinston, 1997). E-commerce security deals with security of IS in all industries. Because most of the servers on the Internet are based on open systems architectures (such as UNIX), and because so many of the services on the Internet allow one to send and receive information, the opportunities for unscrupulous individuals to wreak havoc on the Internet is a very real threat.

There has been considerable concern about the security and reliability of the Internet and e-commerce. The reliability and security is the major obstacle in the implementation and use of Internet-based E-commerce for business operations especially for electronic payment transactions (Cronin, 1996; Collin, 1997; Hawryszkiewycz, 1997; Aldridge et al., 1997; Kalakota, 1997). Security on the Internet is a constant and serious concern (Verity, 1995; Bersntein et al., 1996; Bloch et al., 1996; Keating, 1996; Cockburn and Wilson, 1996; Hinrichs, 1997; Forcht, et al., 1997; Solms, 1997; Wilson, 1997; Lichtenstein and Swatman, 1997; Ahuja, 1997).

The lack of security, reliability and accountability make Internet transactions too risky for many users. One major concern of merchants is how to shield their computers from hackers. If a hacker breaks into their system, they could steal thousands of credit card numbers. One large study found that 66 percent of respondents cited credit card fraud as a major concern about shopping online. Other concerns included unsolicited mailing lists (65 percent), merchant legitimacy (59 percent), and lack of data privacy (57 percent) (Stores, 1996). The Internet allows stockpiling of thousand of credit card numbers untraceably. Thieves use each number once, reducing the probability of investigation (Matsumoto, 1995). For instance, one master hacker stole more than 20,000 credit card numbers (Aldridge et al., 1997). Total intrusions into government, business and university computers on the Internet increased by 344 percent between 1993 and 1995 (Keating, 1996). According to International Data Corporation (IDC, 1997) "Without a common set of specifications and products that guarantee security and reliability, the Internet may simply become an interesting public-access network."

Therefore, in order to realise a successful Internet-based e-commerce implementation, e-commerce systems must be secure and reliable. If Internet users do not have confidence that their communications are safe from unauthorised access or modification, they will be unlikely to use the Internet on a routine basis for commerce. That is why, conducting e-commerce over the Internet has to be completely secure, and above all else, this has represented one fundamental reason that has kept both consumers and business users away, a perception of a non-secure environment (Chester and Kaura, 1998). There is no single "magic technology that ensures that the Internet will be secure and reliable. Accomplishing that goal requires a range of technologies (encryption, authentication, password controls, firewalls, etc.,) all supported by trustworthy management infrastructures.

According to the third Annual Ernst & Young / Information Week Information Security Survey (1998), 87% of those currently using the Internet, 66% of those not using the Internet currently, and 85% of those planning to use of the Internet within a year stated that they would increase the use of the Internet for business purposes if security was enhanced.

On the other hand, since e-commerce payment involve actual money, payment systems on the Internet will be a prime target for criminals. And since Internet services are provided today on the networks that are relatively open, the infrastructure supporting electronic commerce must be useable and resistant to attack in an environment where eavesdropping and modification of messages are easy.

As more commerce is conducted over the Internet, the smooth running of the economy will come to depend on the availability of the payment infrastructure, making it a target of attack for vandals. Whether the results of such an attack, or simply because of poor design, an interruption in the availability of infrastructure would be catastrophic. For this reason, the infrastructure must be highly available and should avoid presenting a single point of failure (Neuman and Medvinsky, 1997).

Therefore, this research proposes a positive relationship between the quality of e-commerce system security and reliability and the Internet-based e-commerce implementation success.

Hypothesis 8: *E-commerce system security and reliability are related to Internet-based e-commerce implementation success.*

According to the literature (Verity, 1995; Russell, 1995; Forcht and Fore, 1995; Keating, 1996; Bernstein et al., 1996; Cronin, 1996; Kalakota 1997; Aldridge, 1997; Ahuja, 1997, etc) the security of an e-commerce system is related to its successful use. Internet securities, secure electronic payments in an electronic environment are among the issues that researchers, experts and executives are widely discussing today. This is because one of the major obstacles to mass e-commerce shopping at present is the relative insecurity of paying for goods online using or debit card mediums of payment. Otherwise, as IBM (1997, www.ibm.com/e-business) states: *"most business-to-consumer Web sites have been sleepers."*

Therefore e-commerce technology must be able to provide a reliable tool for commercial electronic communications traffic. When consumer's fear of insecurity of payment or personal information is overcome, e-commerce shopping will explode as a medium for purchasing goods and services.

E-commerce security consists of *Internet security* (the network, system and applications components of the e-commerce solutions) and *transaction security and reliability* (the requirements for secure and reliable e-commerce transactions). According to McCartney (1997) Internet e-commerce system security is a major problem. This is currently being handled by available encryption methods, but the biggest security threat is still exists.

Mougayar (1997) expresses that security is required at several levels and in various and specific models. The following pieces of security must be addressed and tied together in the context of an overall security framework: Firewalls, authentication,

authorisation, non-repudiation, data integrity, secure transactions, private/public key management, encryption, digital signatures, certification process, tunnelling, privacy issues, digital certificates, access security, certification management process, anti-virus software, secure payments, secure content distribution, secure EDI, security middle-ware management, intrusion detection software, ethical hacking, security procedures and trusted operating systems.

From an implementation perspective, the following six functional areas of security are critical (Mougayar, 1997):

- Access security,
- Data and database security,
- Network security,
- System security,
- Transaction security, and
- Application security.

As commercial use of the Internet grows, the demands placed on payment servers will also increase. The payment infrastructure as a whole must be able to handle the addition of users and merchants without suffering a noticeable loss of performance. The existence of central servers through which all transactions must be processed will limit the scale of the system. The payment infrastructure must support multiple servers, distributed across the network.

Further, for some transactions, the identity of the parties to the transaction should be protected; it should be possible to monitor an individual's spending patterns, nor to determine one's source of income. An individual is traceable in traditional payment systems such as checks and credit cards. Where anonymity is important, the cost of tracking a transaction should outweigh the value of the information that can be obtained by doing so (Neuman and Medvinsky, 1997).

As with the introduction of all new information technologies (ie. e-commerce), users have a variety of concerns that they need to weigh up when deciding whether or not to implement Internet-based e-commerce technology (Arnum, 1995; Ahuja, 1997). Concerns relate to the apparent insecurity of the Internet, potential disruption to business because of network failure, the lack of businesses partaking in e-commerce, possibly caused by high set-up and running costs, and slow performance (ie. data transfer) due to inadequate bandwidth. There also appears little overall control because universal standards and legislature have not developed sufficiently (Pattison, 1997).

Further, network and transaction security risks are viruses, hackers, and stealing valuable sensitive corporate data or information. From the reliability perspective, all data and messages being forwarded to and from the Internet are potentially subject to interception and modification while being transmitted (Forcht and Wex, 1996; Lindy, 1996; Zwass, 1996; Wilson, 1997; Forcht, et al., 1997; Clarke, 1997a).

Bernstein et al., (1996), offered the following procedures to overcome with the Internet security issues for the successful implementation of an e-commerce system:

- Design a security infrastructure,
- Build user awareness,
- Plan the technical solution,
- Identify the service offerings,
- Select a reliable delivery mechanism,
- Evaluate each electronic payment system, and
- Make security policies and procedures.

A survey conducted by Cahners Research (a sister organisation of Datamation) with randomly selected 2,000 names from a list of Datamation subscribers who had indicated that there were at least 5,000 employees at their location. Of the survey respondents who were not planning to implement e-commerce system, the high cost

of such systems was the primary reason with 39.6%, followed by *security concerns* with 25% of the respondents (Datamation, 1996).

Further, the results of recent research of one of the most advanced e-commerce user communities in Europe, GUA (GE Information Services User Association) has identified that 90% of survey respondents highlighted *security as the number one issue*, with service levels (82%), viruses (79%), and lack of management understanding of e-commerce (75%) cited as the common areas of concern for Internet-based e-commerce (Jenkins, 1997).

Therefore, e-commerce systems that are not secure will be difficult to market in the industry. The non-secured systems will be more accessible to the layman. This type of unsecured system is susceptible to fraud and hacking. E-commerce system also requires protecting privacy and confidentiality. As great as shopping online sounds, many consumers have been reluctant to purchase online due to concerns over security on the Internet. Corporate computer networks are now communicating with customers, employees and the public via the Internet. Sensitive and critical company information is even more at risk.

Moreover, electronic commerce over open networks such as the Internet will only be feasible if a range of security problems is solved (Laudon and Laudon, 1997). These security solutions depend heavily on the wide-scale use of digital signature and encryption technologies. To deploy these technologies on a wide, possibly global, scale, a specialised infrastructure is needed to ensure that participants can adequately trust each other's public keys. There hasn't been a readily available method of authenticating merchants and card-holders for purchases via the Internet, thereby protecting both parties against security risks and fraud. A security protocol, SET (Secure Electronic Transaction) was developed and has been made available for better security (1997).

Research shows that network security threats come both from the Internet itself and the organisation's internal networks. The internal network can be compromised

owing to lack of proper configuration, access controls that are overly restrictive forcing employees to circumvent them, or failure to closely monitor the network traffic.

Harrington (1995) states " *most information systems (IS) managers have long been aware of the need to maintain system security, particularly against computer fraud and sabotage. However, IS managers may not consider their own programmers and analysts as possible perpetrators of computer fraud and sabotage. In addition, programmers and analysts may be in prime position to initiate other forms of security problems, such as computer cracking, viruses, and software copyright violations. Yet it is tempting for managers to believe that most such security problems come from outside the organisation.*"

A system attack can more easily be launched from within an organisation, by an authorised user, than from the outside. It is estimated that 80-95 per cent of the total number of security incidents are results on an insider attack (Bernstein et al., 1996).

On the other hand, when the internal network is connected to the Internet, the whole network is potentially exposed to outside intruders. Information stored on the network is in danger of being read, altered, or even stolen. The potential attacker can also intercept communications and make individual services or the whole network unavailable for legitimate users. Therefore, this study proposes a positive relationship between e-commerce implementation success and the security of e-commerce systems.

Hypothesis 8a: *E-commerce system security is related to Internet-based e-commerce implementation success*

For a company to depend upon Internet-based e-commerce as a way of doing business, there must be absolute certainty surrounding the security issues – not just privacy and confidentiality, but authentication, audibility, performance and data integrity. According to the literature and research, e-commerce system reliability (network system and transaction), is very important for the successful

implementation of e-commerce (Hayashi, 1996; Kalakota, 1997; Aldridge et al., 1997).

On the other hand, because of the distributed and dynamic routing of messages over the Internet, there have been concerns that e-commerce documents may get lost or delayed in transmission (Segev, Porra, Roldan, 1995). In some cases, heavy traffic on the Internet may delay business operations by slowdown the processes and ultimately this effect the businesses and the reliability of e-commerce server system.

According to NCSA (1996), securing Internet for reliable e-commerce is probably the biggest challenge that IS professionals have yet faced. There is considerable, and justifiable, fear that confidential information, such as credit cards and personal details, could be intercepted during transmission over the Internet, for example when submitting an order form over the Web.

Moreover, it is important for any business organisation looking to set up a Web site to ensure that all possible steps have been taken to protect against foreign enforcement action or block access to anyone without an authorised password. An organisation should ensure that its Web site complies with commonly agreed standards of fairness and accuracy as well as the laws of the countries towards which the e-commerce system is aimed.

Further, an extremely secure electronic payment system is virtually useless if it is not able to operate fast enough to handle consumers' needs, or if it restricts the volume of trade so that merchants are forced to turn customers away. Thus when addressing the issue of information security, a business does not only face the question: "what security services do I need a secure-system to provide?" but also "which secure-system will best ensure that I can continue to use my information as efficiently as possible?" When implementing a secure-system, this availability translates into the speed of operation of the secure-system, its reliability, and its ease of use. Therefore, this research proposes a positive relationship between the reliability of e-commerce and the Internet-based e-commerce system implementation success.

Hypothesis 8b: *E-commerce system reliability is related to Internet-based e-commerce implementation success*

4.10 TECHNOLOGICAL COMPETENCE FOR E-COMMERCE IMPLEMENTATION

Technological readiness and access to technical competence is important for successful implementation of an Internet-based e-commerce system. The technological competence is related to the existence and use of the organisations' information technology infrastructure, in terms of hardware, software, and human resources components, which support or enable implementation of an Internet-based e-commerce system.

When Internet-based e-commerce system implementation level is decided, the technological competence should be evaluated, because it has direct influence in the organisation's ability to implement, maintain and utilise an e-commerce system, and if the potential competitors and business partners can use it. Organisational and technical factors like skills of personnel, internal training, work procedures and routines, workload and process flexibility show the technical competence of an organisation, and could predict the e-commerce utility for the organisation.

According to Nord and Tucker (1987), competence to introduce and manage an innovation (like Internet-based e-commerce system) has two components:

- Firstly, a *technical side,* which has to do with the substance of the innovation. The organisation has to know what technology to use, how to use it, and how to judge its effectiveness in using it.

- Secondly, a *social side,* which has to do with the ability of the organisation to activate and coordinate its resources. An organisation needs to be able to activate the employees in appropriate ways, to motivate performance, and to integrate activities to achieve desired outcomes.

Nord and Tucker (1987) states that organisations lacking technical readiness are unable to recognise their inadequacies. Information technology (IT) is referenced in the literature as an enabler of the change. IT can be the enabler of change but it can also be a potential constraint as most firms have existing IT infrastructures built up over many years (Hammer 1990; Taylor 1996). The state of the IT infrastructure can influence the choice of either a radical or an incremental implementation plan (Broadbent and Weill, 1995). Managers and technical people in the organisation must have the ability to recognise what the requirements will be during the implementation of an e-commerce system.

Social competence is derived from some combination of personal skills in working with others and structures that aid integration. The social or human component of technological competence, in terms of the level of information technology knowledge, experience and expertise within the organisation, needs to be addressed when implementing change (Martinez, 1995).

On the other hand, Grover et al. (1995) also suggest that taking good care of the required technology may be required along with other factors for successful implementation of an IT related project. Many of the most serious problems occur when social competence is lacking and, as a result, a representative of the technical issues lacks appropriate resources and/or influence.

Innovations could be classified according to the degree of differentiation and integration required; organisations could be classified according to their initial standing on these dimensions. Such initial classifications can be used as a basis for predicting success as well as for examining what processes organisations use to cope with varied degrees of fit between structure and innovation requirements. As a result, social as well as technical readiness is important for implementation success. However, what constitutes readiness depends upon the nature of the innovation and the requirements that it represents for a particular organisation (Tornatzky and Klein, 1982).

Although it is true that the Web today represents a great way to test some commercial ideas with a low cost of entry, and thus is a great equaliser and a real marketplace for innovation, a working system very soon requires additional resources, in terms of technology and skills (eg. professional design, integration of legacy systems, process integration, etc.). The experience with the Web shows that most systems started by small entrepreneurs have been bought by larger companies, as they needed more resources to expand. For example, one of the most popular publishing sites on the Web today, Time-Warner's Pathfinder, currently employs about 100 people, to develop and maintain its content.

Therefore, a sustained presence in cyberspace requires strong technological competencies and effectiveness, in order to optimise use of the resources devoted to it as success proves the validity of the business model. Thus, this study examines the relationship between organisation's technological competence and Internet-based e-commerce implementation success.

Hypothesis 9: *The quality of technological competence is positively related to Internet-based e-commerce implementation success.*

4.11 E-COMMERCE SYSTEM APPLICATIONS

One of the biggest challenges in developing and implementing a successful Internet-based e-commerce system is choosing the right software solution for the intended business operations' Web site, which can make the difference between making money and losing money on the Internet.

According to IBM (1997), an e-commerce business is no less demanding than any other type of business operation, but it is also quite different. Instead of the traditional brick and mortar storefront, everything happens in the form of bits and bytes flowing over the Internet and what makes it tick is e-commerce software. To engage in e-commerce, a company needs to develop a Web site and fill it with Web

pages that can inform customers, display products, conduct purchase transactions. and provide feedback and results.

The most critical decision is determining which e-commerce software a company should use to do all of this. Normally, Internet-based e-commerce system software will consist of a product catalogue (where the online customers select what they want to order), a shopping cart (where product selections are collected), transaction security (credit authorisation and other payment schemes), and order processing (shipping, taxes, inventory, etc.). All of these elements combine to give the store a personality and the end users a true shopping experience.

On the other hand, the key to success in developing e-commerce strategies that ensure the organisation is not 'locked-in' to specific information technologies or software products. One way to remain flexible is to adopt an open systems strategy for the acquisition of e-commerce system solutions software. Obtaining or developing the suitable e-commerce system solution software for e-commerce implementation is quite a challenge because of the newness of the e-commerce solutions.

As a result, the e-commerce department can ensure and provide appropriate and qualified e-commerce software solutions for successful e-commerce system implementation. Thus, this study hypothesise the relationship between the e-commerce software solutions (applications) and Internet-based e-commerce implementation success.

Hypothesis 10: *The appropriate e-commerce system software application is positively related to Internet-based e-commerce implementation success.*

E-commerce system software applications should be acquired to solve business operations problems in every aspect. When implementing an Internet-based e-commerce system, if one chooses a complicated Web application involving

significant amounts of data and time consuming for users, this could be an inadequate approach for a successful Internet-based e-commerce implementation. Therefore, Web-based applications for e-commerce system implementation should be simple, and user-friendly.

On the other hand, as the Internet continues to transform commerce, the quality of the method of payment is one component which is critical to successfully conducting business across a network (Dahl, and Lesnick, 1996; Lynch and Lundquist, 1996; Neuman and Medvinsky, 1997; O'Mahony, et al., 1997). In terms of convertibility of the e-commerce payment system, users of the Internet will select financial instruments that best suit their needs for a given transaction. It is likely that several forms of payment will emerge, providing different trade-offs with respect to their characteristics. In such an environment, funds represented by one mechanism should be easily represented by others.

Thus, this study examines the relationship between the importance of the quality of applications and Internet-based e-commerce implementation success.

Hypothesis 10a: *The quality of applications is positively related to e-commerce implementation success.*

There are now so many Web sites on the Internet, with so much text, so many graphics, and so little distinction among them. Besides, consumers floating on the Internet have different favourite and taste, and their perception of taste can vary from time to time. This forces organisations to become more flexible and competitive in the way they try to market and sell products and services to consumers. As a result, companies can choose to re-design their Web site with value-added services (for example, educating and training customers with more information) constantly.

In terms of efficiency of e-commerce payment system, according to Neuman and Medvinsky (1997), royalties for access to information may generate frequent payments of small amounts. Applications must be able to make these "micro-

payments" without noticeable performance degradation. The cost per transaction of using the infrastructure must be small enough that it is significant even for transaction amounts in the order of cents. Therefore, this study examines the relationship between the efficiency of applications and Internet-based e-commerce implementation success.

Hypothesis 10b: *The efficiency of applications is positively related to Internet-based e-commerce implementation success.*

E-commerce system flexibility and user-friendliness will make that system popular. In general, e-commerce system solutions are designed to suit any particular business applications or operations. Therefore, the user-friendliness of e-commerce will depend on how the analysts and programmers structure their system. From the user point of view, the more user-friendly the system the more likely they will try it. Today, many e-commerce systems and Web sites are reasonably user-friendly, but some are not. User-friendliness makes it easy for the end user to understand the system and use it. E-commerce is developed in such a way that it can be used in any business operation or environment.

In order to be effective any system has to be user-friendly. E-commerce is designed in such a way that the end-user has to spend no time at all in understanding the system. In the case of the e-commerce system not being user-friendly, the possibility or the saleability of the system automatically reduces. Therefore the implemented e-commerce system should be simple to use from both an organisational and user (including customer/consumer) perspective. Simplicity leads to mass use and mass use leads to wide acceptability. For instance, providing users/customers with easy-to-use and easy-to-find tools that allow them to search, find and make selections in the most effective manner is the key for successful Web-based e-commerce implementation.

Moreover, ease of content management is also essential for Web sites that are constantly changing. Content that is dynamically generated by databases should be

mandatory for any e-commerce Web site. The easier it is to manage an e-commerce Web site, the greater the flexibility in continually changing the content offerings. Further, internal Web sites (ie., Intranet) should be able to be managed by different departments and units for product or service up-dates, new product/service launching, marketing and promotions.

Therefore, organisations should carefully evaluate potential applications for e-commerce implementation. It is important to establish ways in which information can be freely made available to those who can make the optimum use of it, in decision making and improving customer service. Knowledge is the most enduring asset of any organisation, and the scarce and precious knowledge held by employees needs to be incorporated into new applications. With the conflicting demands for improved customer service and yet further reduced costs, organisations are deploying more knowledge-based systems to provide customers with the assistance they seek. Internet Web technology is particularly suited to this type of application, helping customers through problem identification and resolution.

Moreover, in terms of ease-of-use of the e-commerce payment system, users should not be constantly interrupted to provide payment information and most payments should occur automatically. Payments beyond a certain threshold should require approval. Users should be able to monitor their spending without going out of their way to do so (Neuman and Medvinsky, 1997).

An e-commerce payment mechanism should also be flexible and appropriately meet variations of the guarantees needed by the parties to a transaction, the timing of the payment itself, requirements for auditability, performance requirements, and the amount of the payment. The payment infrastructure should support several payment methods, including instruments analogous to credit cards, personnel checks, cashier's checks, and even anonymous electronic cash (Neuman and Medvinsky, 1997). These instruments should be integrated into a common framework during the implementation process.

The usefulness of a payment mechanism is dependent upon what one can buy with it. Thus a payment instrument must be widely accepted. Where payment mechanisms are supported by multiple servers, users of a server must be able to transact business with users of other servers. Therefore, it is very important to select the most flexible payment system for e-commerce implementation success. Accordingly, this study examines the relationship of the importance of the flexibility (user-friendliness) and adequacy of applications, and Internet-based e-commerce implementation success.

Hypothesis 10c: *The level of flexibility and adequacy of e-commerce system applications is related to Internet-based e-commerce implementation success.*

As a summary, the above hypotheses were extracted from the literature review and the relevant literature was classified in *Appendix-A*. The next chapter presents a proposed research model and research methodology.

CHAPTER 5

RESEARCH METHODOLOGY

"No matter how long you have gone on a wrong road, turn back"
Mevlana

Chapter 5 explains the research model, research subject, construction and testing of the research instruments, survey questionnaire, methods to be used in data analysis and data analysing procedures.

5.1 RESEARCH MODEL

This research model is constituted by the components of *Appendix-A*, which summarised the research variables from the literature. As mentioned in the previous chapters, research variables included in the proposed model are drawn from the previous IS/e-commerce related studies. Since there were no CSF studies on Internet-based e-commerce implementation success at the time of this research, possibly because of its newness and lack of theory, IS related CSF studies have been taken into account to construct the proposed research model. Case discussions, conference presentations, briefings and recommendations from the senior professional Internet and e-commerce consultants or executives who have practical experience with electronic commerce in Australian corporations have also been used at the construction stage of the proposed research model.

The research model below (Figure 5.1) shows the proposed relationships among the ten critical success factors and Internet-based electronic commerce implementation success in Australian organisations. The ten proposed critical success factors (CSF) for the successful implementation of Internet-based e-commerce are:

1. Top Management Commitment and Support for E-Commerce Implementation,
2. Communication, Training, and Facilitation between E-Commerce Department and Users,

3. User Appreciation of E-Commerce System,
4. E-Commerce Department's Service Function,
5. Integration of E-Commerce with Organisation's Existing Business Functions,
6. Organisational Effectiveness for E-Commerce System,
7. Change Management (Managing Technological and Organisational Change),
8. Internet/E-Commerce System Security and Reliability,
9. E-Commerce System Applications,
10. Technological Competence for E-Commerce.

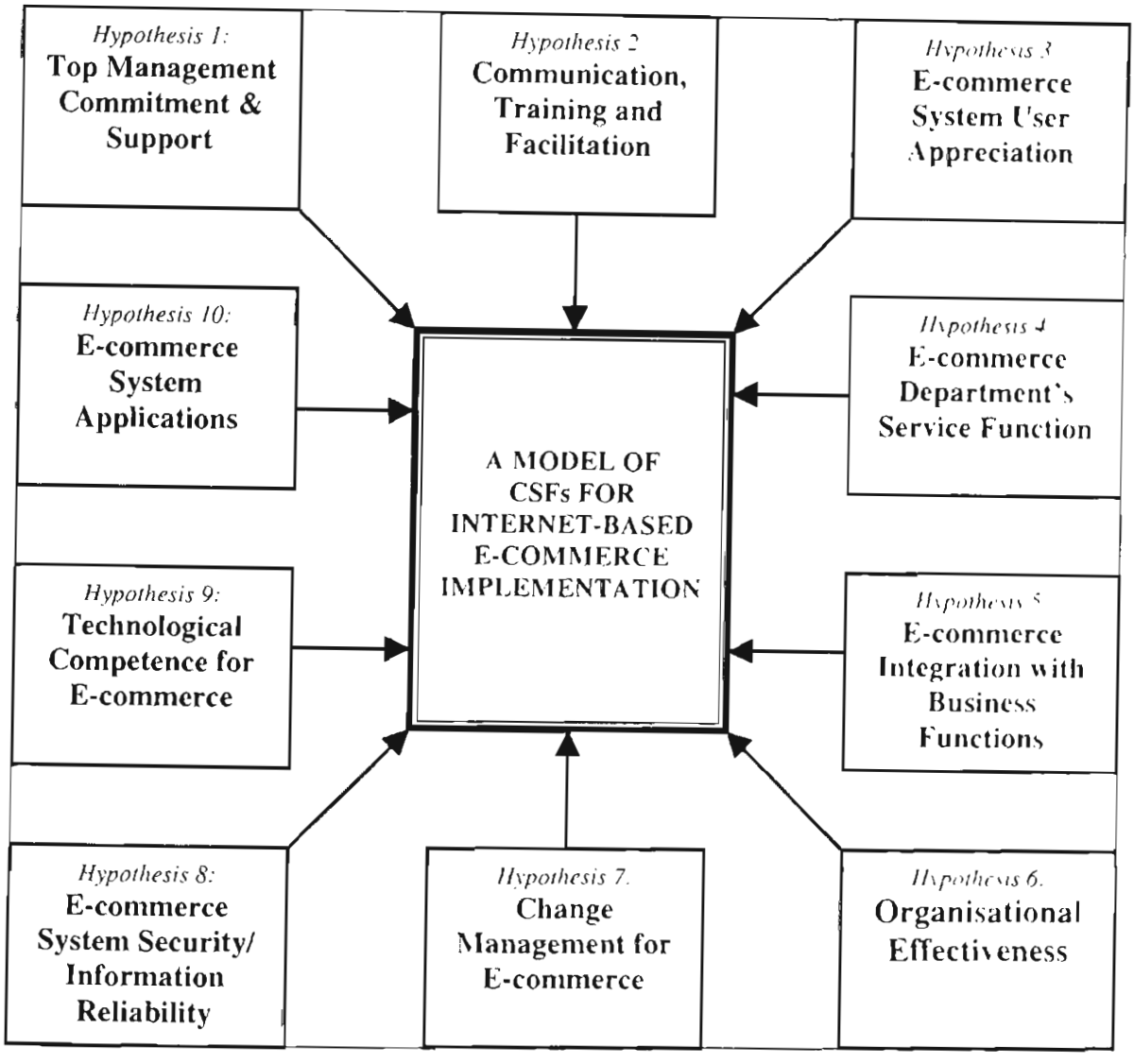

Figure 5.1: The Proposed Conceptual Research Model and Hypotheses.

The proposal of this study is that those ten factors will be related to the strategic success of Internet-based e-commerce implementation in Australian businesses as defined by Internet and electronic commerce executives and managers.

5.2. RESEARCH SUBJECT

The aim of this study is to identify critical success factors by employing the mailed questionnaire method directed at the directors or managers responsible for Internet-based e-commerce system implementation activities in order to develop a comprehensive model for successful implementation of Internet-based e-commerce in business operations.

Accordingly, this study is based on the assumption that organisations of all sizes (small/medium/large or multi-national) will able to implement Internet-based e-commerce system in some degree or level because of the Internet's ability to level the playing field (this is claimed by many experts such as Cronin, 1994 and 1996; Mougayar 1997, Kalakota and Whinston, 1997; Kalakota, 1997; etc.).

This study used e-commerce executives and managers from Australian business organisations already running a Web site on the Internet for e-commerce purposes as its subjects. The reason for selecting these survey subjects was that the system implementation success measures in past studies have been significantly related to the perceived CSF of IT/IS and electronic commerce managers. The studies from Miller and Doyle (1987) and from Raghunathan et al., (1989) both cited some other case and/or empirical studies that uphold this relationship. Miller and Doyle and Raghunathan et al. also have examined and supported this concept in their studies

Therefore, if an IT/IS or e-commerce) executive/manager administers the e-commerce function corresponding to his/her CSF, he/she can improve e-commerce system implementation performance and effectiveness. Thus, this research attempts to extract CSFs for implementation of the Internet-based e-commerce in Australian business organisations from an e-commerce executive/manager's point of view.

The sample subjects were information systems and Internet-based e-commerce managers from the randomly selected Australian companies. Due to this research focus on Internet-based e-commerce implementation success factors, it has been

decided that the surveyed companies should have Internet-based e-commerce implementation experience and currently be a user of e-commerce systems in their business operations in order to be included in this survey.

Therefore, *this survey required that respondents should use at least one Internet-based e-commerce application (i.e. order taking, order processing, inventory management, customer service, supplier-vendor activities, payment handling, invoicing, settlement, etc.) besides e-mail to qualify.*

In other words, because this study's purpose is to identify the most important CSFs for implementation of Internet-based e-commerce, it is logical to select the subjects from those who are already using Internet-based e-commerce in their business operations rather than any businesses who has only a Web presence on the Internet but not doing any business activities with it. *Further, in order to avoid the possible biases in this study's outcome, the survey sample was randomly selected from different industry sectors and sizes.*

In order to identify the companies that are using Internet-based e-commerce for business operations, the author of this research conducted an extensive search for Web sites of Australian firms at all major local Internet servers and Internet search engines from September to December 1997. In addition, to obtain more understanding of what firms were using the Internet for, sample of Web sites were examined via the Internet from all major industry sectors. These provided specific examples to illustrate the broad categories of use identified through the questionnaire survey.

Because there was no comprehensive *Australian Internet Electronic Commerce User's Business Index* or *Directory* available at the time this survey was prepared, the Internet-based e-commerce user company names were obtained from the Internet by using one of the most popular and comprehensive global Internet search engines, Yahoo! Business Directory at *http://www.yahoo.com* (1997). Literature shows that Yahoo! has a very comprehensive index and is a very user-friendly search engine.

Neely (1996), describes Yahoo! as "*Yahoo is by far the most popular Web search engine on the Internet.*" According to Finch (1996), Yahoo is one of the most popular indexes for research purposes, not only because it has the capacity of keyword searches, but also because it is a hierarchical index that can be browsed quite easily. It is organised around an extensive set of categories, subcategories, etc. (for example, country name, companies index, business types, etc). Yahoo permits the use of Boolean "and" and "or" in keyword searches. Searches can look for the keyword(s) in the title, URL, or in the comments entered when a site is submitted for inclusion in Yahoo.

Just over 3,000 Australian Company Web sites were obtained across a wide range of industry types. It is important to mention here that nobody knows the exact number of companies on the Internet. It is because, on the one hand, there is no authority controlling the Internet. No one owns the Internet. And on the other hand, the number of businesses on the Internet is increasing very rapidly. All the survey data show only estimate numbers.

1,000 company Web sites were randomly selected as survey sample from that population. Prior to sending the questionnaires, company Web sites were visited via Internet to find out if these sites are being used for any sort of e-commerce activities or business operations other than just a presence on the Internet. The author of this study visited the Web pages of each potential respondent to gain as much understanding as possible of the organisation and to obtain the name, if listed on the Web site, of the owner/director/IS/E-commerce manager of the firm. The purpose of the Web site, the use being made of electronic mail and the extent to which multi-media was being utilised were also examined.

Basically, a company with a Web site presence with company information and product or service information together with price details and the ability to order the products or services by electronic mail, even if notable to order or pay online, is accepted for the sample survey.

Thus, 530 of the 1,000 companies were found to be useful (regardless of company size, type or sales consideration to eliminate or reduce bias) for the survey. Then questionnaires were sent to 530 Internet-based e-commerce user companies along with a cover letter explaining the academic aims of the study and assuring respondent confidentiality and explaining that the information they gave will only be used for research purposes. A pre-paid return envelope was also included to the questionnaire.

The questionnaire, addressed to the CEO/president of the firm, requested them to pass the questionnaire to the highest appropriate person responsible for Internet/e-commerce system development, implementation and maintenance. The respondents targeted were the person in charge of the Internet-based e-commerce system implementation program, i.e. CIO, IS/Internet/e-commerce director, or manager. In order to improve the response rate, a follow up telephone call or letter was sent after four weeks to those who did not respond. As a result, from the 530 questionnaires, 227 were returned. *213 of the 227 answered all questions to represent a complete response, yielding a useable response rate of 40.2 percent.*

Due to the newness and lack of theory and prior empirical study of the critical success factors for Internet-based e-commerce implementation success, the author of this study adopted a multi-step (two-phased) field research approach to guide the research data collection.

Phase-1 of the research involved a very comprehensive review of the literature from more than 1,500 studies (journal articles, papers, business magazines, case-studies, books, conference proceedings, Internet-based digital papers) related to IS/IT, Internet and e-commerce systems, followed by two-step Focus Group discussions for reviewing issues (ie. proposed model and success factor items) generated from the previous literature by the researcher of this study. In order to make a preliminary validation of the instrument, a pilot test was also undertaken with the 2nd Focus Group participants prior to a final mail survey.

- **Phase I:** *Literature Review, Initial Model Propositions and 2-Focus Group Discussions:*

1. Identified the Internet-based e-commerce implementation success factors from the literature,
2. Established a preliminary research model that links implementation success factors,
3. Identified and examined implementation success factors with the 1st Focus Group discussions,
4. Discussed and re-shaped the initial research instruments and questionnaire items based on the 1st Focus Group results,
5. Conducted pre-test (pilot-test) with the 2nd Focus Group participants and realised a 2nd Focus Group meeting to fine-tune the research instrument.

There have been two separate Focus Group interviews conducted prior to a main questionnaire survey. The first one was prior to questionnaire preparation. This Focus Group meeting has been realised in order to investigate and discuss the current implementation success factors from the experts and practitioners' point of view. According to Sekaran (1992) and Zikmund (1997), Focus Groups are appropriate when the concepts being investigated are relatively new (like Internet-based e-commerce) or diffuse and careful qualitative work is needed before structured, questionnaire-based research can be taken.

The 1st Focus Group consisted of 9 members whose primary area of expertise is in the field of Internet-based e-commerce and its implementation. The Focus Group members were selected from various industry sectors and company sizes. The choice of selection of the members was based on willingness to co-operate, involvement in e-commerce implementation, nature of knowledge and expertise, and seniority.

The 1st Focus Group meeting has been held on the first Friday afternoon in October, 1997, and lasted for about 3 hours. Friday afternoon was selected with the consultation of the Focus Group members. The aim of the 1st Focus Group was to

discuss industry experiences of e-commerce implementation success factors. During the meeting, Focus Group members' opinions and experiences on the e-commerce implementation and success factors and proposed research model have been discussed in details. The comments made by the participants during the Focus Group session were transcribed and then content-analysed for questionnaire generation. Their recommendations along with the literature review were the base of the preparation of the research questionnaire.

The 2nd Focus Group meeting was conducted in order to pilot-test (pre-test) and fine-tune the prepared survey questionnaire items before the survey was actually conducted. Again the 2nd Focus Group members were selected from different industry sectors and company size. For the 2nd Focus Group meeting, the 1st Focus Group members were not called in order to remove any possible bias. The choice of selection of the members was based on willingness to co-operate, involvement in e-commerce implementation, nature of knowledge, and expertise. The 2nd Focus Group size was limited to 10 members whose primary area of expertise was Internet-based e-commerce and its implementation.

The questionnaire was distributed in advance to the 2nd Focus Group participants in order to give them enough time to review the questionnaire items more carefully and to get effective and efficient feedback prior to group discussion time. In this, respondents were asked to comment on the format and appropriateness of questions, and to suggest material they believed should be included in the instrument or removed from it.

The 2nd Focus Group meeting has again been held on the first Friday afternoon in December, 1997, and lasted for about 3 hours. As a result, their feedback and recommendations for change were incorporated into the survey. Other experts from academia and industry (including a number of e-commerce consultants) also provided insights into the face validity of the instrument. The author also contacted a number of IT/IS executives who have extensive experience with e-commerce. The

author met with several Internet-based e-commerce user firms as part of this study. *The input from all the sources was used in the design of the final questionnaire.*

- **Phase II:** *Questionnaire Survey, Data Analysis and Conclusions:*

1. Define a conceptual model that links Internet-based e-commerce implementation success factors,
2. Conduct the questionnaire survey within the various industrial sectors,
3. Test the model using survey data,
4. Define final model of critical success factors for the successful implementation of Internet-based e-commerce in business operations.
5. Conclusions and recommendations to researchers and practitioners based on the research results.

5.3 SURVEY INSTRUMENT

This research used a survey-based field study of Internet-based e-commerce executives/managers to investigate the hypotheses. The author of this research initially decided to do the survey via e-mail, but the majority of Focus Group members suggested that e-mail was not an appropriate medium for some reasons relating mainly to the respondent's privacy and other concerns as stated by Bayne (1997):

- It used to be that e-mail got someone's attention quickly, but now e-mail is actually easier to ignore. Recipients are using filters in their e-mail programs to sort incoming mail by the various header fields and message text. Finally, if the recipient is not interested, there is no paper sitting around after the message has been deleted;
- A monetary incentive can not be included to reply in e-mail;
- E-mail surveys exclude anyone who doesn't want to respond via e-mail;
- Results from e-mail surveys may be skewed by false and forged responses;
- E-mail responses are not necessarily completed in a timely manner;

- E-mail surveys, like other types of surveys, have their percentage of incomplete answers.

In addition to that, because of the confidentiality and privacy concerns as raised by 2nd Focus Group members at the 2nd Focus Group meeting, the mail survey was selected to facilitate collection of the required data, sampling cost, time frame, and the required sampling size.

To enhance the cooperation of electronic commerce managers, the instrument was designed to answer within 30 minutes. A cover letter with instructions explained that individual responses would remain anonymous and the survey was part of a research study for identifying the critical success factors for implementation of Internet-based electronic commerce in business operations. A copy of the results from the survey was also offered to the respondents upon their request.

5.4 QUESTIONNAIRE

In this section the questionnaire design and testing procedure were described in details as below.

5.4.1 Questionnaire Design

The questionnaire design was based on the research model described above which employed selected appropriate critical success factor items from Rockart (1982), Martin (1982), Magal et al. (1988), Bergeron et al. (1993), and other important studies related to IS/Internet-based e-commerce implementation success. The relationships of these factors are shown in Table 5.1 below.

Table 5.1: The Relationship of CSF Studies

ROCKART's CSF	MARTIN's CSF	THIS RESEARCH'S CSF
▪ Service -Operations and Development)	▪ Data Processing Operations ▪ System Development	▪ E-Commerce System Application ▪ E-Commerce System Integration
▪ Communications between Users and IS Staff	▪ Relationships with the Management of the Parent Organisation	▪ Communication, Training and Facilitation ▪ E-Commerce User Appreciation
▪ Human Resources	▪ Human Resources Development	▪ E-Commerce Department's Service
▪ Re-positioning the IS Function -Technical -Organisational -Psychological -IS Managerial	▪ Support of the Objectives and Priorities of the Parent organisation ▪ Management of Change (Technological) ▪ Management Control of the IS/DP Organisation	▪ Top Management Commitment and Support ▪ Organisational Effectiveness ▪ Technological Competence ▪ Change Management ▪ Internet/E-Commerce Security and Reliability

This research used ten major factors, which have been discussed as the most important criteria from different dimensions of the literature.

Table 5.2 below, classification of factors from the literature, provided brief, categorised variables for e-commerce system performance (success), ten groups of expected critical success factors (CSFs) of Internet-based electronic commerce implementation success, and the source of the relevant literature.

Based on Table 5.2, this study acquired the proposed variables for the questionnaire. The questionnaire had four sections. *Appendix-B* presents a sample of the questionnaire that was used to measure the strategic CSF of Internet-based e-commerce implementation success in business operations.

Table 5.2: Description of Questionnaire Design for Internet-based E-Commerce Implementation Success in Business Operations

Questionnaire		Source	Measurement Variables	Measurement Scale
Section	Item Number	Appendix-A		
1	1-7	N/A	Organisations' Internet-based E-Commerce Implementation Status	Various scale
2	1-12	Section-1	E-Commerce System Implementation Performance (Success)	7-point Likert-type
3	1-8	Section-2	Top Management Commitment and Support	7-point Likert-type
	9-16	Section-3	Communication between E-Commerce Department's and Users	
	13-15	Section-3.1	Training and Facilitation for Users	
	17-28	Section-4	User Appreciation for E-Commerce System	
	17-21	Section-4.1	User Satisfaction	
	22-25	Section-4.2	User Attitude	
	26-28	Section-4.3	User Involvement	
	29-35	Section-5	E-Commerce Department's Service Function	
	36-41	Section-6	E-Commerce Integration into Existing Business Functions	
	42-49	Section-7	Organisational Effectiveness	
	50-58	Section-8	Change Management for E-Commerce System	
	59-67	Section-9	E-Commerce System Security and Reliability	
	59-63	Section-9.1	E-Commerce System Security	
	64-66	Section-9.2	E-Commerce System Reliability	
	68-74	Section-10	Technological Competence for E-Commerce System Implementation	
	75-88	Section-11	Appropriate E-Commerce System Applications	
	75-78	Section-11.1	Quality of Applications	
	79-82	Section-11.2	Efficiency of Applications	
	83-88	Section-11.3	Flexibility and Adequacy of Applications	
4	1 to 4	N/A	Organisation's and E-Commerce Manager's Demographic Data	Various scale

5.4.2 Items of the Questionnaire

The first section of the questionnaire consisted of seven questions to identify how long the companies have been using the Internet, Web site, and e-commerce; what percentage of their overall business operations are conducted via Internet-based e-commerce; to what level the companies have implemented e-commerce; what

specific business function is the major purpose for using e-commerce to support; and the level of their satisfaction with the Internet-based e-commerce system in business operations.

The second section was composed of twelve items to measure the performance resulting from Internet-based e-commerce implementation from the e-commerce executives and managers point of view. This set of questions, which corresponded to Section 2 of Table 5.2, employed a 7-point Likert-type scale for the measurement. To validate the construct measurement of these twelve questions, a single question regarding the overall performance measurement of Internet-based E-commerce implementation was included in Section 1, question number 7.

The third section of the questionnaire contained 88 items measuring ten potential critical success factors for Internet-based e-commerce implementation in business operations. These questions used a 7-point Likert-type scale for measurement. Each potential CSF had a general question for the purpose of validating the construct. Components of the questions are described briefly as below:

- Questions 1 through 8 measured top management commitment and support. Question 8 is a general question for validating the construct. These eight questions were obtained from Section-2 of Appendix-A.

- Questions 9 through 16 measured the importance of communication between users and the e-commerce department. Question 16 is a general question for validating the construct. This set of questions was obtained from Section-3 of Appendix-A.

- Questions 13 through 15 measured the importance of training and facilitation for users. This set of questions was obtained from Section-3.1 of Appendix-A.

- Questions 17 through 28 measured users' appreciation with Internet-based e-commerce implementation. This set of questions was obtained from Section-4 of Appendix-A.

- Questions 17 through 21 measured users' satisfaction with Internet-based e-commerce implementation. These five questions were obtained from Section-4.1 of Appendix-A.

- Questions 22 through 25 measured the importance of user's attitudes. These questions were obtained from Section-4.2 of Appendix-A.

- Questions 26 through 28 measured the importance of user's involvement in Internet-based e-commerce implementation. This set of questions was obtained from Section-4.3 of Appendix-A.

- Questions 29 through 35 measured the importance of the e-commerce department's service function to users. This set of questions was obtained from Section-5 of Appendix-A.

- Questions 36 through 41 measured the importance of e-commerce integration with the organisations' existing business functions. This set of questions was obtained from Section-6 of Appendix-A.

- Questions 42 through 49 measured the importance of the organisational effectiveness for e-commerce implementation. This set of questions was obtained from Section-7 of Appendix-A.

- Questions 50 through 58 measured the importance of change management for e-commerce system. This set of questions was obtained from Section-8 of Appendix-A.

- Questions 59 through 67 measured the importance of e-commerce system security and reliability. This set of questions was obtained from Section-9 of Appendix-A.

- Questions 59 through 63 measured the importance of e-commerce system security. This set of questions was obtained from Section-9.1 of Appendix-A.

- Questions 64 through 66 measured the importance of e-commerce system reliability. This set of questions was obtained from Section-9.2 of Appendix-A.

- Questions 68 through 74 measured the importance of technological competence for e-commerce system implementation. This set of questions was obtained from Section-10 of Appendix-A.

- Questions 75 through 88 measured the importance of e-commerce system applications. This set of questions was obtained from Section-11 of Table 1.13.

- Questions 75 through 78 measured the importance of the quality of applications. This set of questions was obtained from Section-11.1 of Appendix-A.

- Questions 79 and 82 measured the importance of the efficiency of applications. This set of questions was obtained from Section-11.2 of Appendix-A.

- Questions 83 through 88 measured the importance of the flexibility and adequacy of applications. This set of questions was obtained from Section-11.3 of Appendix-A.

The fourth section of the questionnaire contains a set of three questions concerning demographic information of the respondents' organisations and one personal question about e-commerce executives/managers. The first three questions about organisational characteristics measured the type of organisation, number of employees, and approximate annual sales. Question number four is about e-

commerce executives/managers' positions in the organisation. Question number five is simply an option for the respondents to accept the reward of a summary of the survey's results. The last question requests respondents to add any comments if they wish to do so. Thus, the total of active questions is 111, plus 2 optional.

The third section of the mailed questionnaire was randomly reordered from the designed questionnaire. The reason for rearranging the survey questions in random order was to avoid a systematic error.

5.4.3 Questionnaire Testing

According to the literature, the research instrument must meet the requirements of accuracy and validity (Churchill 1979). Several procedures were adopted to ensure and verify these criteria. These procedures are as follows:

- Non-response bias
- Reliability
- Content validity
- Construct validity
- Practicality.

These procedures are described briefly below:

5.4.3.1 Non-response Bias

Mailed questionnaire surveys often have problems of non-response bias (Emory and Cooper, 1991). In order to avoid and minimise this problem, several steps were taken:

1. The length of the questionnaire was limited to seven single-sides of a standard A4 page.
2. Confidentiality of company information was guaranteed.

3. The guarantee of anonymity to respondents was made in the cover letter.
4. The cover letter was personalised to the appropriate available name.
5. A return postage-paid envelope was enclosed for the convenience of the respondent.
6. Offer for a survey result summary to the respondent upon request was provided as an incentive.

Question number one in the third section of the questionnaire - organisation type - was used to test non-response bias because of its availability. The descriptive statistics (mean, variance, and standard deviation) of this question of the two groups (respondents' group and the obtained sample group) was compared and tested.

Chi-square was used to test the differences between groups. If the differences are not significant, the inference is that data obtained from the respondents is not significantly different from the whole sample, which is true in this study; thus, there is no significant response bias. However, if the differences are significant, there is a response bias. The results from the Chi-square testing are reported in Chapter 6.

5.4.3.2 Reliability

A research instrument can be evaluated by three criteria: reliability, validity, and practicability (Allen and Yeh, 1979; Emory and Cooper, 1991). *Reliability refers to the stability or consistency of the measuring instrument; it reflects the accuracy of the measuring instrument.* A measure is reliable to the extent that it provides consistent outcomes. Churchill (1979) suggested that reliability can reflect the validity of the measure and that the *coefficient alpha* should be the first measure to be calculated.

This study calculated *Cronbach's coefficient alpha* for the reliability test. Cronbach's alpha (α) is a formula for determining the reliability based on internal consistency; it has the most utility for multi-item scales at the interval level of measurement (Emory and Cooper 1991). Nunnally (1978) suggested that reliability of .50 and .60 should

suffice and that reliability beyond .80 is wasteful, while Churchill (1979) suggested the cutting-off point of 0.70. This study took 0.60 as the cutting point. Any measurement items or factors found to be lower than 0.60 were eliminated from the data analysis, but no items were eliminated for this reason.

5.4.3.3 Content Validity

Validity refers to the extent to which an instrument evaluates what it is intended to measure. Two types of validity were tested in this study: *content validity and construct validity.* Content validity refers to the appropriateness or "representativeness" of the content. According to Emory and Cooper (1991), content validity provides a careful and systematic examination of the instrument.

This study made a thorough and extensive search and review of literature to explore and include all possible items in the measure. Several Internet and e-commerce executive/managers, academics and consultants' opinions were requested about how well the instrument met the standards; carefully defined the question involved; and selected the items to be scaled and the scales to be used which all determine the content validity (Emory and Cooper, 1991). To safeguard the content validity, this study reviewed the related CSF and Internet-based e-commerce implementation studies, defined the question cautiously, and summarised these factors in *Appendix-A.*

In addition to that, two Focus Group discussion sessions were conducted. One pre-test (pilot-test) of the questionnaire was also employed and revised the instrument prior to the final survey.

5.4.3.4 Construct Validity

Construct validity refers to the extent to which an instrument measures a theoretical construct; that is, it evaluates the theory which the construct is based on, as well as the measuring instrument used (Emory and Cooper, 1991). Two common methods of evaluating construct validation are:

1. Examining the correlations between total scores and item score, and
2. Conducting a factor analysis.

The first method assumes the total score is valid, and if the item scores correlate with the total score, then this implies the whole construct is valid. The second method, factor analysis, is considered one of the most powerful approaches to examine construct validity because factor analysis provides for examination of the underlying structure of the overall measure (Ives et al., 1983). Therefore, *this study used factor analysis for validity tests.*

5.4.3.5 Practicality

The third criterion for examining a measurement instrument is practicality, which refers to economic factors, convenience of execution, and interpretability of data and results (Emory and Cooper, 1991). This study considered the trade-off among research variables, budget, ease of management, and estimated which research instrument best accommodated the objectives of this research study.

5.5 DATA ANALYSIS

Descriptive statistics on demographic variables and variables of interest were computed first. Several multivariate statistical techniques were used in data analysis: factor analysis, canonical analysis and regression analysis. Chapter 6 presents this detailed information. This study used the SPSS (Statistical Package for the Social Science) for data analysis.

5.5.1 Factor Analysis

Factor analysis is a multi-variate statistical technique "*whose primary purpose is data reduction and summarisation*" (Hair, Anderson, and Tatham, 1987). Factor analysis can be used to identify a relatively small number of factors from a larger set of variables. The new composite factors can be used to represent relationships among

sets of variables with a minimum loss of information (Hair, Anderson, and Tatham, 1987). *The main purpose of factor analysis is data reduction and summarisation.* According to Hair et al., (1987), factor analysis can perform four functions:

1. To identify underlying constructs or factors that explain the correlation among a set of variables. The original set of variables can be reduced to a small set, which accounts for most variance of the initial set.
2. To summarise a large number of variables with small number of derived variables. Factor analysis can search data for qualitative and quantitative contrast.
3. To test a hypothesis about the structure of the variables.
4. To determine the number of dimensions required to represent a new set of variables for subsequent regression, correlation or discriminant analysis.

There are several techniques for factor extraction of the general factor analysis model. The most used two are *the principle components analysis model* and *the common factor analysis model.* The principles components model is used when the objective is to summarise most of the original information in a minimum number of factors for prediction purposes. A common factor analysis model is used primarily to identify underlying factors or dimensions not easily recognised.

This study selected the principal components analysis model. Once the model had been selected, the factor was rotated. The purpose of rotation is to achieve a simple structure. This means each factor would have non-zero loading for only some (preferably one) of the variables, thus permitting the factors to be differentiated from each other. If several factors to be high loadings on the same variables, it is difficult to ascertain how the factors differ.

There are two options for factor rotation: orthogonal and oblique. In orthogonal, the factors are extracted so that the factors axes are maintained at 90 degrees. Thus, each factor is independent and orthogonal from all other factors. The correlation between factors is arbitrarily determined to be zero. In oblique, the axes of factor rotation are not maintained at 90 degrees. The extracted factors are correlated; the underlying

factors must be similarly correlated (Hair et al., 1987). This study chose the orthogonal factor rotation method, *varimax*, because the varimax rotation method supported by *SPSS* provides a better matrix construct (where each variable loads onto as few factors as possible) (Emory and Cooper, 1991).

5.5.2 Canonical Correlation Analysis

The canonical analysis approach was adopted to reflect the interrelationships among sets of composite criterion variate. This research also adopted canonical correlation analysis for measuring the relationships between the predictor and criterion sets of variables.

Canonical correlation analysis is a multi-variate model, which measures the overall relationship between the canonical variate of the two sets of multiple variables. One set of multiple variables is the *predictor (independent) variable* and the other set is the *criterion (dependent) variable* (Hair, Anderson, and Tatham, 1987). Canonical correlation can be viewed as an extension of multiple regression, but is different in two aspects. The first difference is that canonical correlation predicts multiple dependent variables from multiple independent variables, while multiple regression predicts a single dependent variables from a set of multiple independent variables. The second difference is that canonical correlation can deal with metric or non-metric data, while multiple regression only deals with metric data. Canonical correlation analysis can perform the following objectives:

- Determine whether two sets of variables are independent of one another or, conversely, determine the magnitude of the relationships that may exist between the two sets.
- Derive a set of weights for each set of criterion and predictor variables such that the linear combinations themselves are maximally correlated.
- Derive additional linear functions that maximise the remaining correlation, subject to being independent of the preceding set of linear compounds.

- Explain the nature of whatever relationships exists between the sets of criterion and predictor variables generally by measuring the relative contribution of each variable to the canonical functions that are extracted (Hair, Anderson, and Tatham, 1987).

This study attempted to find the relationships between the expected CSF and Internet-based e-commerce implementation success. Another object of this study was to explore a model for prediction of Internet-based e-commerce implementation success. Canonical correlation analysis was used in achieving these two purposes.

5.5.3 Multiple Regression Analysis

Multiple regression analysis is a statistical tool for analysing the relationship between a single dependent variable and several independent (predictor) variables. The objective of multiple regression is to obtain a functional equation from the known independent variables in order to predict the dependent variable (Hair, Anderson, and Tatham, 1987). A regression model also can measure the strength relationship among variables from multiple regression. According to Hair et al., (1987), multiple regression can achieve the following four purposes:

- Determine the appropriateness of using the regression procedure in analysing a problem.
- Examine the statistical significance of the attempted prediction.
- Examine the strength of the association between the single dependent variable and the one or more independent variables.
- "Predict the values of one variable (dependent variable) from the values of others (independent variables or predictor variables)"; with the assumption "that each additional predictor variable gives more information and therefore a better prediction about the criterion variable."

This study utilised the multiple regression model for the above four purposes as well as for the exploration of a model of prediction for Internet-based e-commerce implementation success. Chapter 6 presents the regression results.

5.6 DATA ANALYSING PROCEDURES

In order to achieve the objectives of this study, five statistical steps and procedures were used. Table 5.3 shows the data analysis procedures. The first step was to calculate descriptive statistics; the second step was to examine the non-response bias; the third step was to check the reliability and validity; the fourth step was to test the hypotheses; the fifth step was to develop a prediction model.

Table 5.3: Step by Step Data Analysis Procedures

ANALYSIS	FUNCTION
1. Demographics Chi-square Analysis	Test non-response bias
2. Cronbach's Alpha Factor Analysis	Test Reliability and Validity
3. Factor Analysis	Identify Critical Success Factors
4. Canonical Correlation Analysis	Determine Relationships Between CSF and Internet-based E-Commerce Implementation Success
5. Multiple Regression Analysis	Develop a Predictive Model

5.6.1 Calculating Descriptive Statistics

A descriptive measure of demographic variables and interested variables was computed. A descriptive measure can provide the information of mean, standard deviation, and the distribution of the collected data.

5.6.2 Examining for Non-response Bias

A Chi-square goodness-of-fit test was used to measure the presence of non-response bias in the sample data by comparing the difference between two groups (respondents and the whole mailed sample). Chi-square tests whether a significant difference exists between two groups (Emory and Cooper 1991). In this study, the comparison between the mailed group and the respondent group was based on the

demographic characteristic of *industry type*, because of only its availability. If there is insufficient evidence for non-response bias, the data may represent the whole sample, and the results of the finding can be inferred for the whole population. If there is response bias, the result can only be inferred for the respondent group.

5.6.3 Checking Reliability and Validity

The applicability of the instrument should be evaluated. Cronbach's coefficient alpha (α) was used to test the internal consistency, or the stability of relevant dimensions and overall measures of the instrument. If alpha is below 0.60, the item should be omitted from further data analysis. However, since this study found all of the alphas are higher than .60, no items were eliminated. The alphas for the proposed hypothesis sets were computed first. Then the alphas from the extracted factor were checked again, determining that the calculation did provide a consistent result. The results from factor analysis can reveal which instrument items are homogenous or reflect the same underlying dimensions of the construct.

Two validity tests were performed in this study:

1. Content validity examines the sampling adequacy of the instrument. This requirement was fulfilled by:

- A complete and extensive review of the literature for all possible items to be included in the measurement;

- Internet and e-commerce academics, consultants and executives/managers were asked to criticise the description and clarity of the questionnaire; and

- A pre-test (pilot-test). Questionnaire was tested with 2nd Focus Group participants prior to the final survey. The modification of the questionnaire was then based on these experts' opinions.

2. Construct validity deals with the theoretical construct of the instrument. This study performed a factor analysis for the following purposes:

- To assess construct validity, that is to determine the set of CSF by choosing a particular factor loading pattern, thus achieving content validity and construct validity.

- To eliminate the unnecessary items from the instrument. By checking the factor loading, and utilising factor extraction and rotation options, unnecessary variables can be eliminated. The identified CSF could serve as the predictor variable of the prediction model.

5.6.4 Testing the Hypotheses and Identify the CSF

Canonical correlation analysis was used to identify and test the hypotheses of the relationships between Internet-based e-commerce implementation success and the Internet-based e-commerce implementation activities. Table 5.4 shows the statistical procedure of hypotheses testing.

Two types of compound factors were derived from factor analysis. One type was a composite factor from the dependent factor variables, the Internet-based e-commerce implementation success factor. Predictors, another type of composite factors, are the expected critical success factors (CSFs).

The degree of linear relationship between Internet-based e-commerce implementation and the success factor can be determined. Each hypothesis was tested for the significance of relationship. A *p-value* was calculated for the observed significance level by *F-statistic*. *This study used 0.05 as the significance level for hypothesis testing.*

Table 5.4 Statistical Procedure of Hypotheses Testing

RESEARCH HYPOTHESES	DEPENDENT VARIABLES, Y SCALE: 7-POINT LIKERT TYPE (Item No. Section 2)	INDEPENDENT VARIABLES, X SCALE: 7-POINT LIKERT TYPE (Item No Secuon 3)	STATISTICAL PROCEDURE
H1: Commitment and Support from Top Management	Internet-based E-Commerce Implementation Performance (Item no. 1-12)	Commitment and Support (Item no. 1-8)	Canonical Correlation Analysis
H2: Communication between E-Commerce Departments and Users H2a: Training and Facilitation for Users		Communication between E-Commerce Department's and Users (Item no. 9-16) Training and Facilitation for Users(Item no. 13-15)	
H3: User Appreciation for E-Commerce System H3a: User Involvement H3b: User Attitude		User Appreciation for E-Commerce System (Item no. 17-28) User Involvement (Item no. 26-28) User Attitude (Item no. 17-22)	
H4: E-Commerce Department's Service Function		E-Commerce Department's Service Function (Item no. 29-35)	
H5: E-Commerce Integration into Existing Business Functions		E-Commerce Integration (Item no. 36-41)	
H6: Organisational Effectiveness		Organisational Effectiveness (Item no. 42-49)	
H7: Change Management for E-Commerce System		Change Management (Item no. 50-58)	
H8: E-Commerce System Security and Reliability H8a: E-Commerce System Security H8b: E-Commerce System Reliability		E-Commerce System Security and Reliability (Item no. 59-67) E-Commerce System Security(Item no. 59-63) E-Commerce System Reliability (Item no. 64-66)	
H9: Technological Competence for E-Commerce System		Technological Competence (Item no. 68-74)	
H10: Appropriate E-Commerce System Applications H10a: Quality of Applications H10b: Efficiency of Applications H10c: Flexibility and Adequacy of Applications		Appropriate E-Commerce System Applications (Item no. 75-88) Quality of Applications (Item no. 75-78) Efficiency of Applications (Item no. 79-82) Flexibility and Adequacy of Applications (Item no.83-88)	

5.6.5 Developing a Prediction Model

The regression model identifies the contribution of each factor and the relationship between Internet-based e-commerce implementation success and the expected CSF. The regression model also can predict the strength of the relationship among the variables.

This study then constructed a prediction model based on the findings from these multi-variate analysis methods. This study assumed this prediction model should have the proposed critical success factors for Internet-based e-commerce implementation success and serve as an evaluation guide for e-commerce success. The following chapter, Chapter 6, presents the details and the findings from these statistical analyses.

CHAPTER 6

DATA ANALYSIS AND RESULTS

"What's my ROI on E-commerce? Are you crazy? This is Columbus in the New World. What was his ROI?"

Andy Gorve, Chairman, Intel Corporation.

In this chapter, the results of the data analysis will be presented for this study. There are six sections in this chapter. The first section discusses the response rate. The second section describes the descriptive statistics for the respondents. The third section reports the results of the evaluation of non-response bias between the whole sample group and the respondent group. The fourth section discusses the results of preliminary reliability and validity tests for all items and the posterior reliability of the extracted factors. The fifth section presents the testing of the hypotheses and the results. Finally, the components of a predictive model based on the research are discussed in the sixth section.

6.1 RESPONSE RATE

The research instrument was a questionnaire that contained four sections (See *Appendix-B*) with a total number of 111 questions. The main principle for selecting respondents within a firm was to find persons who possess the best insight into the critical success factors of Internet-based e-commerce implementation in their business operations. Therefore, as mentioned in Chapter 5, the research subjects were Internet-based e-commerce executives/managers from various Australian companies that were selected randomly from the *Yahoo's Internet Business Directory*.

The chosen sample size was 530. Thus, 530 questionnaire was mailed to Internet-based e-commerce user company executives/ managers from Australian business firms in January 1998. A follow up letter and a second copy of the questionnaire were mailed to all of these companies' Internet/e-commerce executives/managers in February 1998. The results are based on the assumption that 530 questionnaires reached the sample subjects. From these 530 questionnaires, 227 were returned for

an initial response rate of 42.8 percent. From the 227 returned questionnaires, 213 answered all questions to represent a complete response, yielding a useable response rate of 40.2 percent. This response rate is high, given the comprehensiveness and length of the instrument when comparing the literature (Baroudi and Orlikowski, 1989). This high response rate was achieved possibly for the following reasons:

- Follow-up letters, phone calls and contacts.
- Internet-based e-commerce is a new business medium and companies, therefore, are very keen to share and get information from the research source for their companies' benefits.
- Companies are also keen to help Internet and e-commerce related research and its usage in business operations to increase academic and community awareness about e-commerce. In this way, they try to help to reach the desired mass market (this conclusion was supported when the researcher contacted a number of respondents to ask them why they were interested).

6.2 DESCRIPTIVE STATISTICS

The Internet-based e-commerce system implementation trend and its usefulness are discussed first. Then the mean values and the standard deviations of the 12 e-commerce implementation success (performance) items and of the 88 e-commerce implementation activities are reported. Finally, the demographics of the organisations and the Internet e-commerce executives/managers are described in the last section.

6.2.1 The Internet/E-Commerce Implementation Trend and Company Usage

The first section of the questionnaire contains 7 questions (refer to Appendix-B) which are related to the Internet, Web site and Internet-based e-commerce implementation trend and company usage. Table 6.1 provides the numbers and percentages of how long the surveyed companies have been connected to the Internet for business use.

The table shows that 33.8 percent of the respondents (72) have used the Internet for 2-3 years. Secondly, about 25.8 percent of companies (55) have used the Internet for 1-2 years. This followed 19.2 percent of companies (41) have used the Internet for 3-4 years. 12.7 percent of companies (27) have used the Internet for less than 1 year. The last and least, only 8.5 percent of respondents (18) have used the Internet for more than 4 years. Also, 72.3 percent of the respondents connected to the Internet less than 3 years ago.

Table 6.1: Respondent Organisations' Years of Using Internet

Years of Internet Connection	Number of Companies	Percentage (%)
Less than 1 year	27	12.7
Between 1 to 2 years	55	25.8
Between 2 to 3 years	72	33.8
Between 3 to 4 years	41	19.2
More than 4 years	18	8.5
Total	213	100.00

Table 6.2 shows the numbers and percentages of the respondent companies' Web site presence length on the Internet. The table shows that 42.7 percent of the respondents companies (91) have had a Web site on the Internet for 1-2 years. Secondly, about 24.4 percent of companies (52), have had a Web site for 2-3 years. This was followed by 18.3 percent of companies (39), have had a Web site on the Internet for less than 1 year. About 9.4 percent of companies (20) have had a Web site on the Internet for 3-4 years. Only 5.2 percent of respondents (11) have had a Web site for more than 4 years. 85.4 percent companies have had a Web site on the Internet for less than 3 years.

Table 6.2: Respondent Companies' Web Site Presence on the Internet in Years

Years of Web Site Presence	Number of Companies	Percentage (%)
Less than 1 year	39	18.3
Between 1 to 2 years	91	42.7
Between 2 to 3 years	52	24.4
Between 3 to 4 years	20	9.4
More than 4 years	11	5.2
Total	213	100.00

Table 6.3 shows the numbers and percentages of the respondent companies' Internet-based e-commerce commencement length on the Internet. The table shows that 39.9 percent of the respondents (85) have used Internet-based e-commerce for 1-2 years. Secondly, about 34.3 percent of companies (73), began to use the Internet-based e-commerce less than 1 year. This was followed by 16.9 percent of companies (36) using e-commerce for 2-3 years. About 6.6 percent of companies (14) have been using e-commerce for 3-4 years. The last and least, only 2.3 percent of respondents (5) have declared using Internet-based e-commerce for more than 4 years. It is interesting that, according to the table 91.1 percent of respondents have been using Internet-based e-commerce in their business operations for less than 3 years.

Table 6.3: Respondents' Internet-Based E-Commerce Commencement in Years

Years of Internet-Based E-Commerce Commencement	Number of Companies	Percentage (%)
Less than 1 year	73	34.3
Between 1 to 2 years	85	39.9
Between 2 to 3 years	36	16.9
Between 3 to 4 years	14	6.6
More than 4 years	5	2.3
Total	213	100.00

Table 6.4 shows the numbers and percentages of the respondent companies' Internet-based e-commerce usage percentage in their overall business operations. The table shows that 36.6 percent of the respondents (78) have been conducting 0-20 percent of their business operations via Internet-based e-commerce. Secondly, about 28.6 percent of companies (61), have been conducting 21-40 percent of their business operations on the Internet-based e-commerce. This was followed by 18.3 percent of companies (39) conducting 41-60 percent of their business operations on Internet-based e-commerce. About 11.3 percent of companies (24) have been conducting 61-80 percent of their business operations via Internet-based e-commerce. Only 5.2 percent of respondents (11) have been conducting 81-100 percent of their business operations via Internet-based e-commerce. According to the table, only 16.5 percent of respondents (35) have been conducting more than 60 percent of their business operations via Internet-based e-commerce.

Table 6.4: Respondents' Internet-Based E-Commerce Usage Percentage

Percentages (%) of E-Commerce Usage in Business Operations	Number of Companies	Percentage (%)
0-20	78	36.6
21-40	61	28.6
41-60	39	18.3
61-80	24	11.3
81-100	11	5.2
Total	213	100.00

Table 6.5 shows the numbers and percentages of the respondent companies' Internet-based e-commerce implementation level. The table shows that 35.2 percent of the respondents (75) have implemented middle level (eg. integration with operational databases, package tracking, job postings) Internet-based e-commerce. Secondly, about 33.3 percent of companies (71) have implemented basic level (eg. dynamic Web pages/searchable site) Internet-based e-commerce. This was followed by 17.4 percent of companies (37) implementing very basic level (eg. static Web pages) Internet-based e-commerce.

About 10.8 percent of companies (23) have implemented advance level (eg. customer transactions through the Internet, selling products and services, buying and selling stocks, applying for loans, etc.) e-commerce. Only 3.3 percent of respondents (7) have implemented full level (eg. a Web site application that address all aspects of a business transaction-marketing, purchasing, distribution, payment, settlement, etc.) Internet-based e-commerce.

According to the table, none of the respondents have implemented next generation enterprise level (eg. Web is used to conduct virtually all business functions: internal, customer and supplier, business partners and even competitors) Internet-based e-commerce.

Table 6.5: Respondents' Internet-Based E-Commerce Implementation Levels

Internet-based E-Commerce Implementation Level	Number of Companies	Percentage (%)
Very Basic Level	37	17.4
Basic Level	71	33.3
Middle Level	75	35.2
Advance Level	23	10.8
Full E-Commerce Level	7	3.3
Next Generation Enterprise Level	0	0
Total	213	100.00

Table 6.6 shows the numbers and percentages of the respondent companies' specific business functions supported by Internet-based e-commerce. The table shows that the leading business function is *purchasing/order processing* with 68.5 percent of the respondents (146). The next most prevalent response is *electronic payment/ settlement* with 61.5 precent of the respondents (131). The third most prevalent response is *sales/marketing/business development* with 54.9 percent of the respondents (117). The fourth most prevalent response is *customer service/communications* with 49.3 percent of the respondents (105). This is followed by *internal applications* with 45.5 precent of the respondents (97). Then, logistics was cited by 39.4 percent of the respondents (84). The least is *resource management* with 33.8 percent of the respondents (72). The table clearly shows that, companies have been using Internet-based e-commerce to support a wide range of business functions.

Table 6.6: Respondents' Specific Business Functions Supported by Internet-Based E-Commerce

Specific Business Functions supported by Internet-based E-Commerce	Number of Responses	Percentage (%)
Sales/marketing/business development	117	54.9
Purchasing/ order processing	146	68.5
Electronic payment/ settlement	131	61.5
Customer service/communications	105	49.3
Logistics	84	39.4
Resource management	72	33.8
Internal applications	97	45.5

Table 6.7 shows the rates of respondents' overall business operations satisfaction with Internet-based e-commerce system implementation. The table shows that 34.3 percent of the respondents (73) were '*satisfied*' with Internet-based e-commerce in their business operations. Then, 22.1 percent of the respondents (47) were '*very satisfied*' with Internet-based e-commerce in business operations. 18.3 percent of the respondents (39) cited they were '*neutral*' (uncertain) about the satisfaction (performance) of Internet-based e-commerce in business operations. This is followed by '*extremely satisfaction*' with 12.2 percent of the respondents (26). Then, 10.8 percent of the respondents (23) rated as '*dissatisfied*'. Only 2.3 percent of the respondents (5) were '*very dissatisfied*' with the Internet-based e-commerce in business operations. According to the table 68.6 percent of the respondents (146) were extremely/very/satisfied whereas only 13.1 percent of the respondents (28) were very/dissatisfied. This result clearly shows that *the majority of the respondent managers considered the overall performance of Internet-based e-commerce in business operations to be quite successful.*

Table 6.7: Respondents' Internet-Based E-Commerce Satisfaction Rate

Internet-based E-Commerce Satisfaction Rate	Number of Companies	Percentage (%)
Very Dissatisfied	5	2.3
Dissatisfied	23	10.8
Neutral	39	18.3
Satisfied	73	34.3
Very Satisfied	47	22.1
Extremely Satisfied	26	12.2
Total	213	100.00

6.2.2 Internet-based E-Commerce Implementation Success Items in Business Operation

In the second section of the questionnaire, 12 items were used to measure the improvements in business operations performance with the Internet-based e-commerce implementation. The measurements of e-commerce implementation

success are made on a *Likert* type scale of 1 (Strongly Disagree) to 7 (Strongly Agree).

Table 6.8 shows the means and standard deviations of the 12 items that measure the improvements in business operations performance. The 12 improvement items are:

1. Improved system availability, flexibility and usefulness (Y1),
2. Simplified and streamlined business processes (Y2),
3. Improved speed of product/service cycle (eg. delivery speed, lead time and purchasing cycle) (Y3),
4. Improvements in product/service and information quality (Y4),
5. Time savings in business operations and management (eg. reduced order process cycle and transaction times) (Y5),
6. Cost savings in business operations and management (eg. from reduced inventories, communication, order process, access to real-time data) (Y6),
7. Improved overall productivity and efficiency of the users (through reduced operations and process cycle/shortened cycle time) (Y7),
8. Improved internal/external communications and relationships between users (employees, customers, suppliers) and management (Y8),
9. Higher user/customer satisfaction (through better information/service quality and timely response) (Y9),
10. Increased sales, revenues and market share (through access to new and wider local/global markets) (Y10),
11. Enhanced competitive advantage (faster and cheaper development of new products/service) (Y11), and
12. Improving effective decision making and empowerment of users (increased job satisfaction) (Y12).

The mean values ranged from 5.076 to 5.672 on a scale of 1 (Strongly Disagree) to 7 (Strongly Agree). The standard deviation ranged from 1.053 to 1.478. "Simplified and streamlined business processes (Y2) has the highest mean value of 5.672. "Improved internal/external communications and relationships between users and

management (Y8)" has the second highest mean value of 5.532. "Improved system availability, flexibility and usefulness (Y1) has the third highest mean value of 5.497. "Increased sales, revenues and market share (Y10)" has the lowest mean value of 5.076, but has the highest standard deviation of 1.478.

Table 6.8: Descriptive Statistics of the 12 Internet-based E-Commerce Implementation Success Items

Item Code	E-Commerce Implementation Success Items	Mean (*)	Standard Deviation
Y1	Improved system availability, flexibility and usefulness	5.497	1.197
Y2	Simplified and streamlined business processes	5.672	1.053
Y3	Improved speed of product/service cycle	5.389	1.324
Y4	Improvements in product/service and information quality	5.213	1.178
Y5	Time savings in business operations and management	5.412	1.254
Y6	Cost savings in business operations and management	5.197	1.381
Y7	Improved overall productivity and efficiency of the users	5.136	1.131
Y8	Improved internal/external communications and relationships between users and management	5.532	1.263
Y9	Higher user/customer satisfaction	5.335	1.164
Y10	Increased sales, revenues and market share	5.076	1.478
Y11	Enhanced competitive advantage	5.192	1.134
Y12	Improving effective decision making and empowerment of users	5.254	1.253

Note: (*) On a Scale of 1 (Strongly Disagree) to 7 (Strongly Agree)

6.2.3 Internet-based E-Commerce Implementation Activities

The third section of the questionnaire was composed of 88 questions to measure the importance of factors (activities) for Internet-based e-commerce implementation success. These questions also have a *Likert* type measurement scale of 1 (Strongly Disagree) to 7 (Strongly Agree). Table 6.9 describes the means and standard deviations of the importance rating of 88 Internet-based e-commerce implementation activities for e-commerce system success from the subjects' (e-commerce executives/managers) perspective. As discussed in Chapter 5, these 88 items are expected to be categorised into 10 groups:

1. Management commitment and support for e-commerce implementation;
2. Communication, training, and facilitation of e-commerce department and users;
3. User appreciation of e-commerce system;

4. E-commerce department's service function;
5. Organisational effectiveness for e-commerce system;
6. Internet integration with organisation's existing business operations systems;
7. Change management;
8. Internet/e-commerce system security and reliability;
9. E-commerce system applications; and
10. Technological competence for Internet-based e-commerce.

The mean values for the 88 items were ranged from 5.103 to 5.765 on a scale of 1 (Strongly Disagree) to 7 (Strongly Agree). The standard deviation was ranged from 1.082 to 1.397. *"Commitment and support of management to the e-commerce implementation concept (X8)"* has the highest mean value of 5.765. *"Provide users' participation in the e-commerce system implementation (X27)"* has the lowest mean value of 5.103.

Table 6.9: Descriptive Statistics for E-Commerce Implementation Activities

Item (X)	Variables – E-Commerce Implementation Activities for E-Commerce System Success	Mean (*)	Stand Dev.
X1	Top management's sufficient understanding about the goals of e-commerce system implementation	5.542	1.182
X2	Promote acceptance of the e-commerce implementation concept to the whole firm	5.384	1.273
X3	Promote support of top management for the e-commerce implementation concept	5.579	1.189
X4	Design a strategic e-commerce system implementation planning	5.467	1.263
X5	Promote users' commitment and support for the e-commerce system implementation concept	5.425	1.192
X6	Top management involvement in the e-commerce implementation efforts and processes	5.576	1.275
X7	Successful management leadership for implementation efforts	5.510	1.243
X8	Commitment and support of management to the e-commerce implementation concept	5.765	1.082
X9	Communicate with users about e-commerce procedures and services	5.458	1.198
X10	Provide effective communication among the organisational units	5.536	1.283
X11	Provide coordination through communication of corporate or business departments	5.396	1.234
X12	Communicate with e-commerce users	5.486	1.295
X13	Provide training to e-commerce staff and users	5.467	1.156
X14	Respond to user's request for e-commerce system support	5.338	1.297
X15	Provide information and data sharing among the organisational units	5.445	1.354
X16	Providing reliable and consistent communication and facilitations to all relevant units	5.589	1.167

Table 6.9: Continued...

X17	Improve users' confidence in the e-commerce system	5.395	1.211
X18	Improve access (easier and quicker) to the e-commerce system	5.277	1.265
X19	Improve user productivity by realisation of user requirements	5.491	1.186
X20	Permit control over e-commerce services by users	5.142	1.397
X21	Generate user satisfaction with the implemented e-commerce system	5.534	1.237
X22	Increase the use of implemented e-commerce systems	5.424	1.186
X23	Satisfy user's expectations of the e-commerce system	5.340	1.275
X24	Ease the use of E-commerce system tools for users	5.353	1.267
X25	Provide users' positives attitudes toward e-commerce system implementation	5.246	1.233
X26	Provide users' understanding of the implemented e-commerce system	5.163	1.176
X27	Provide users' participation in the e-commerce system implementation	5.103	1.312
X28	Involve users in e-commerce system implementation	5.593	1.234
X29	Provide competent e-commerce staff	5.432	1.182
X30	Develop and provide a basis for control of e-commerce system guidelines, standards and policies, etc.	5.368	1.243
X31	Manage e-commerce resources effectively and efficiently	5.524	1.194
X32	Provide reliable and qualified e-commerce services, enabling tools and education (training)	5.542	1.154
X33	Facilitate an increase in the productivity of users and their business processes.	5.521	1.186
X34	Provide adequate control for e-commerce system implementation and plan for maintenance and its costs	5.381	1.317
X35	Providing the organisational units with information for 24 hours a day and seven days a week	5.463	1.248
X36	Provide e-commerce system integration with existing business processes	5.584	1.136
X37	Provide seamless integration of all supply chain processes and measurements	5.549	1.173
X38	Integrate e-commerce system with all internal operation functions (eg. order processing)	5.592	1.129
X39	Integrate e-commerce system with all external operation functions (eg. customers, suppliers)	5.635	1.098
X40	Enhance firm's value-chain integration with e-commerce system	5.541	1.184
X41	Provide a high degree of e-commerce integration and consistency across the infrastructure, networks, databases and overall business processes	5.548	1.142
X42	Organisational acceptance of e-commerce concept	5.423	1.241
X43	Attain organisational objectives and strategy for e-commerce system implementation	5.668	1.149
X44	Provide clearly defined on-line business plan	5.517	1.152
X45	Improve organisational effectiveness and performance	5.398	1.169
X46	Increase the quality of decision making	5.476	1.172
X47	Improve general organisational effectiveness	5.592	1.138
X48	Presence of a dedicated organisational structure	5.412	1.276
X49	Adequate organisational commitment and effectiveness	5.391	1.239
X50	Recognise needs for managing change	5.531	1.164
X51	Sufficient anticipation and planning for organisational resistance to change	5.487	1.246
X52	Gain cross-functional cooperation for organisational change	5.412	1.169
X53	Provide necessary changes in the human resource policies for implementation	5.274	1.263
X54	Communicate reasons for change to members of the organisation	5.439	1.174
X55	Provide appropriate employee compensation incentives and training in the new process	5.531	1.168

Table 6.9: Continued...

X56	Set reasonable expectations attributed to implementation as a solution for all organisational problems	5.482	1.127
X57	Organisation's ability to cultural and structural transformation for the new system	5.421	1.284
X58	Facilitate the management of change	5.398	1.219
X59	Determine, implement and control overall Internet/e -commerce system security needs	5.562	1.156
X60	Provide clearly stated Internet security policy, standards and adequate user training on the security issues	5.574	1.165
X61	Provide secure electronic payments infrastructure and convenient delivery mechanism	5.592	1.192
X62	Provide and ensure adequate user privacy and confidentiality	5.664	1.146
X63	Provide overall e-commerce system network and data transaction security; data and database integrity	5.513	1.237
X64	Provide and ensure overall e-commerce system reliability	5.597	1.168
X65	Provide a reliable Internet Service Provider (ISP) and Web server to access quickly and securely.	5.549	1.149
X66	Provide quick system access availability and reliable information on time	5.561	1.186
X67	Provide secure and reliable Internet/e-commerce system	5.718	1.102
X68	Adequate e-commerce application infrastructure (eg. reliable telecommunications network)	5.391	1.167
X69	Sufficient understanding about existing data, applications and e-commerce across the organisation	5.312	1.218
X70	Satisfactory to continually assess emerging Internet/e-commerce capabilities	5.328	1.227
X71	Level of Internet/e-commerce system knowledge, experience and expertise	5.401	1.192
X72	Adequacy of e-commerce-related knowledge and skills of users and managers throughout the organisation	5.374	1.177
X73	Level of technological readiness and access to technical competence (eg hardware, software, and human resources components, etc)	5.472	1.201
X74	Ability of the organisation to identify, activate and coordinate its technological and human resources	5.486	1.189
X75	Provide high quality real-time Web-based e-commerce information and data output	5.513	1.218
X76	Provide high quality e-commerce databases and Web applications	5.562	1.173
X77	Select and install quality hardware and the right e-commerce software solution for the intended business operations	5.548	1.218
X78	Promote high quality applications for the implemented Internet-based e-commerce	5.567	1.193
X79	Provide up-to-date information content on Web site as part of e-commerce value-added services	5.616	1.142
X80	Reduce the business processing; data and maintenance cycle	5.482	1.231
X81	Provide efficient data transaction; convenient and widely accepted e-commerce payment system	5.496	1.184
X82	Improve the efficiency of e-commerce system applications for users	5.367	1.217
X83	Provide flexible and user friendly (ease-of-use) e-commerce system applications	5.418	1.169
X84	Provide availability and easy access to e-commerce system for 24 hours a day 7 days a week	5.612	1.165
X85	Promote applications that make e-commerce system business process easier	5.434	1.213

Table 6.9: Continued...

X86	Promote e-commerce system applications that provide competitive edge for the firm	5.367	1.197
X87	Provide flexible and convenient data transaction and payment methods	5.493	1.234
X88	Provide and promote flexible, adequate, and appropriate applications for e-commerce system implementation	5.589	1.167

Note: (*) On a Scale of 1 (Strongly Disagree) to 7 (Strongly Agree)

6.2.4 Demographics for Organisations and E-Commerce Executives/Managers

The fourth section of the questionnaire was composed of three demographic questions about the organisation and one question related to e-commerce executives/managers' positions. Table 6.10, Table 6.11, Table 6.12, shows three items of demographic data from the respondents' organisations.

Table 6.10 shows that the majority class of organisations were in service (17.4 percent), manufacturing (15.5 percent), IT/Computing (11.3 percent), finance/banking/insurance (10.8 percent) and travel/tourism (8.9 percent) industries.

Table 6.10: Respondent Organisations' Primary Industry (Business) Type

Industry Type	Number of Companies	Percentage (%)
Manufacturing	33	15.5
Trade (Wholesale/Retail)	10	4.7
Housing/Real estate	14	6.6
Engineering/Architecture	7	3.3
Transport/Utility	11	5.2
Service	37	17.4
IT/Computing	24	11.3
Health-care/Medical	12	5.6
Government	9	4.2
Travel/Tourism	19	8.9
Finance/Banking/Insurance	23	10.8
Publishing	9	4.2
Other (education, mining, etc)	5	2.3
Total	213	100.00

Table 6.11 shows the number of the organisations' employees. Most of the organisations (48) have 201 to 500 employees (22.5 percent); 6.1 percent of the

organisations (13) have more than 5,000 employees; and only 3.3 percent of the respondents (7) have less than 10 employees.

Table 6.11: Respondent Organisations' Number of Employees

Number of Employees	Number of Companies	Percentage (%)
Less than 10	7	3.3
11-50	19	8.9
51-100	26	12.2
101-200	33	15.5
201-500	48	22.5
501-1000	37	17.4
1001-5000	30	14.1
More than 5000	13	6.1
Total	213	100.00

Table 6.12 shows the annual sales. 20.2 percent of respondents (43) have annual sales between 100 million to 200 million Australian Dollars. 18.3 percent of respondents (39) follows this with annual sales between 50 million to 100 million Australian Dollars. Then, 15 percent of respondents (32) have annual sales between 10 million to 50 million Australian Dollars. While 5.2 percent of respondents (11) have annual sales more than 1 billion Australian Dollars, only 4.2 percent of respondents (9) have annual sales less than 1 million Australian Dollars. So, Table 6.10 to Table 6.12 clearly shows that the *respondent organisations were ranging from small firms to big firms representing a wide range of industry type and size.*

Table 6.12: Respondent Organisations' Annual Sales

Respondents' Annual Sales	Number of Companies	Percentage (%)
<$1,000,000	9	4.2
$1,000,000-5,000,000	16	7.5
$5,000,0001-10,000,000	25	11.7
$10,000,001-50,000,000	32	15.0
$50,000,001-100,000,000	39	18.3
$100,000,001-200,000,000	43	20.2
$200,000,001-$500,000,000	20	9.4
$500,000,001-1,000,000,000	18	8.5
>$1,000,000,000	11	5.2
Total	213	100.00

Table 6.13 shows the respondent e-commerce executives/managers' positions in the management structure of the organisation. Most of the respondent e-commerce managers (52) were from senior IS/e-commerce management position with 24.4 percent of response rate. Second most respondent managers (48) were from IS/E-commerce director position with 22.5 percent of response rate. This was followed by middle level IS/e-commerce management respondents (39) represented 18.3 percent. The least represented respondents (8) were CEO level with 3.8 percent. Table 6.13 shows that 63.4 percent of respondents were from senior/upper senior level management position.

Table 6.13: E-commerce Executives/Managers' Positions in the Organisations

Management Positions	Number of Companies	Percentage (%)
CEO	8	3.8
CIO	27	12.7
IS/E-commerce Director	48	22.5
Senior IS/E-commerce manager	52	24.4
Middle IS/E-commerce manager	39	18.3
IS/E-commerce manager	25	11.7
Other (Web-master, IS/E-commerce engineer, etc.)	14	6.6
Total	213	100.00

6.3 NONRESPONSE BIAS TEST

Non-response bias was calculated and tested by comparing the survey results obtained from the respondents to the entire sample with regard to only one variable - the *type of the industry* - because of its availability at the designing stage of the questionnaire. Since the sample was selected from the Internet, the only useable variable for non-response bias test was the industry type. Other possible variables, for instance, employee size or annual sales, were not possible to obtain from the companies' Web sites. Industry type is an important criterion (variable) for an Internet-based e-commerce survey to carry out non-response bias test. According to many research surveys, the Internet based e-commerce usage rate is different from sector to sector.

On the other hand, since the useable response rate is high (40.2 percent) and the distribution of the respondents' industry type, employee size and annual sales are nearly uniformly distributed (Table 6.10; Table 6.11; and Table 6.12) non-response bias was not expected.

Table 6.14 shows that 19.4 percent of the entire sample of 530 firms are in manufacturing, 15.7 percent are in service, 12.8 percent are in finance/banking/insurance, and 8.4 percent are in IT/Computing industry. Other types of industry follow. On the other hand, information from the 213 respondent organisations provided similar characteristics. Table 6.14 shows that 15.5 percent of the 213 respondent organisations are in manufacturing, 17.4 percent are in service, 10.8 percent are in finance/banking/insurance, and 11.3 percent are in IT/Computing industry. Other types of industry follow. In another words the differences between the entire sample and firms' response rate were slightly different from each other as seen from Table 6.14. This indicated there was no obvious non-response bias. However, in order to prove this claim, a further statistical analysis has been carried out.

Table 6.14: Comparison of the Survey Sample and the Respondent Companies' Industry Type

Industry Type	Entire Sample (%)	Respondents (%)	Differences (%)
Manufacturing	19.4	15.5	3.9
Trade (Wholesale/Retail)	5.2	4.7	0.5
Housing/Real estate	6.1	6.6	-0.5
Engineering/Architecture	3.9	3.3	0.6
Transport/Utility	6.4	5.2	1.2
Service	15.7	17.4	-1.7
IT/Computing	8.4	11.3	-2.9
Health-care/Medical	6.1	5.6	0.5
Government	3.2	4.2	-1.0
Travel/Tourism	6.2	8.9	-2.7
Finance/Banking/Insurance	12.8	10.8	2.0
Publishing	3.5	4.2	-0.7
Other (education, mining, etc)	3.1	2.3	0.8
Total	100.00	100.00	0.00

The Chi-square goodness-of-fit test was used to analyse the compatibility between two groups. General hypotheses for non-response bias in the Chi-square goodness-of-fit test are:

Ho: *The distributions of the organisations' type of the 213 respondent firms are not different from the distributions of the entire 530 firms.*

Ha: *The distributions of the organisations' type of the 213 respondent firms are different from the distributions of the entire 530 firms.*

The expected frequency of the 213 respondent firms should follow the observed frequency of the entire sample (530 firms). From the Chi-square results, the null hypothesis was accepted. Therefore, the respondents matched the population for the organisation type.

The Chi-square inspected whether the respondent group follows the same distribution of the designated 530 firms. The statistic of the Chi-square test for the type of organisations was found as 27.59 (for degree of freedom 12, and significance level (p-value) .001). This shows that the variance is not large, and the two groups are not significantly different. The Chi-square results indicated that the distribution of the respondent group is not much different from the distribution of the entire 530 firms with respect to the variable. Therefore, the findings from this research can not be limited to the 213 respondent firms, thus results can be accepted as representative of the entire sample (530 firms) and the survey results have not been affected by response bias.

6.4 RELIABILITY AND VALIDITY TEST

In this research, a two-step approach was used for the reliability and validity test of the research instrument:

- The reliability and validity were tested according to the methodology discussed in details in Chapter 5.
- After factor analysis, the reliability of the composed factors was examined.

6.4.1 Preliminary Reliability Test

According to the literature, *reliability refers to the stability or consistency of the measuring instrument.* A measure is reliable to the extent that it provides consistent outcomes. As suggested by Churchill (1979), *reliability can reflect the validity of the measure and coefficient alpha should be measured first.* The calculated coefficient alphas are listed in Table 6.15 which shows the results from the reliability test of 12-Y items (Internet-based e-commerce implementation success) and 88-X items (Internet-based e-commerce implementation activities).

Table 6.15: Cronbach's Alpha for the System Success and E-Commerce Activities

Items (Variable Code)	Mean	Alpha
Internet-based E-Commerce Implementation Success (Y1 to Y12) (Improvements in Systems Performance) Total: 12 items	5.325	.9237
Importance of Internet-based E-Commerce Activities for E-Commerce System Implementation Success (X1 to X88) Total: 88 items	5.479	.9751
Management Commitment and Support (X1 to X8)	5.531	.8635
Communication Between Users and E-Commerce Department (X9-X16) ▪ Training and Facilitation for Users (X13-X15)	5.464 5.417	.8441 .7564
User Appreciation for E-Commerce (X17-X28) ▪ User Satisfaction (X17-X21) ▪ User's Positive Attitude (X22-X25) ▪ User Involvement (X26-X28)	5.338 5.368 5.341 5.286	.8491 .7242 .7438 .7047
E-commerce Department's Service Function (X29-35)	5.462	.7703
Integrating E-Commerce into Existing Business Functions (X36-X41)	5.575	.8147
Organisational Effectiveness for E-Commerce (X42-X49)	5.485	.8362
Change Management for E-Commerce (X50-X58)	5.442	.7873
E-commerce System Security and Reliability (X59-X67) ▪ E-Commerce System Security (X59-X63) ▪ E-Commerce System Reliability (X64-X66)	5.592 5.581 5.569	.8641 .8532 .8193
Technological Competence for E-commerce Implementation (X68-X74)	5.395	.7458
Appropriate E-Commerce System Applications (X75-X88) ▪ Quality of Applications (X75 to X78) ▪ Efficiency of Applications (X79 and X82) ▪ Flexibility and Adequacy of Applications (X83 to X88)	5.508 5.548 5.490 5.486	.8643 .8812 .7945 .7382

The Cronbach's coefficient alpha was calculated on the total 12 Internet-based e-commerce implementation success items (Y1 to Y12). *The overall alpha for Internet-based e-commerce implementation success was .9237.* Nunnally (1978) recommended that an alpha of .50 and .60 should suffice. Since the alpha is very

high, no variable was dropped from further analysis and this research instrument seems to adequately measure the anticipated dimensions.

The 88 Internet-based e-commerce implementation activity variables were grouped into nineteen sets according to the results of the literature review (refer to Appendix-A):

1. The first set contained eight items of management commitment and support (X1-X8) and has a Cronbach's coefficient alpha of .8635.
2. The second set contained eight items of communication between users and e-commerce Department (X9-X16) and has a Cronbach's coefficient alpha of .8441.
3. The third set contained three items of training and facilitation for users (X13-X15) and has a Cronbach's alpha of .7564.
4. The fourth set contained twelve user appreciations for e-commerce items (X17-X28) and has a Cronbach's coefficient alpha of .8491.
5. The fifth set contained the total five user satisfaction items (X17-X21) and has a Cronbach's coefficient alpha of .7242.
6. The sixth set contained the total four user's positive attitude items (X22-X25) and has a Cronbach's coefficient alpha of .7438.
7. The seventh set contained the total three user involvement items (X26-X28) and has a Cronbach's coefficient alpha of .7047.
8. The eighth set contained seven e-commerce Department Services items (X29-35) and has a Cronbach's alpha of .7703.
9. The ninth set contained six items of Integrating e-commerce into existing business functions (X36-X41) and has a Cronbach's coefficient alpha of .8147.
10. The tenth set contained eight items of organisational effectiveness for e-commerce (X42-X49) and has a Cronbach's coefficient alpha of .8362.
11. The eleventh set contained nine items of change management for e-commerce (X50-X58) and has a Cronbach's coefficient alpha of .7873.
12. The twelfth set contained nine items of e-commerce system security and reliability (X59-X67) and has a Cronbach's coefficient alpha of .8641.

13. The thirteenth set contained a total of five items of e-commerce system security (X59-X63) and has a Cronbach's coefficient alpha of .8532.
14. The fourteenth set contained a total of three items of e-commerce system reliability (X64-X66) and has a Cronbach's coefficient alpha of .8193.
15. The fifteenth set contained seven items of technological competence for e-commerce implementation (X68-X74) and has a Cronbach's coefficient alpha of .7458.
16. The sixteenth set contained a total of fourteen items of appropriate e-commerce system applications (X75-X88) and has a Cronbach's coefficient alpha of .8643.
17. The seventeenth set contained a total of four items of quality of applications (X75 to X78) and has a Cronbach's coefficient alpha of .8812.
18. The eighteenth set contained a total of four items of efficiency of applications (X79- X82) and has a Cronbach's coefficient alpha of .7945.
19. The nineteenth set contained a total of six items of flexibility and adequacy of applications (X83-X88) and has a Cronbach's coefficient alpha of .7382.

None of the nineteen sets have a Cronbach's alpha smaller than .7047; and the overall Cronbach's alpha is .9751 for the entire 88 Internet-based e-commerce implementation activity items. None of the items were dropped from further statistical analysis because they are all reliable based on Nunnally's criterion. This indicated that these 88 items provide a satisfactory measure of the intended dimensions.

6.4.2 Validity Test

Both content and construct validity were investigated for the 12-Y items (Internet-based e-commerce implementation success) and the 88-X items (Internet-based e-commerce implementation activities). Content validity examines the appropriateness or "representativeness" of the content. This study was predicted on a reasonably thorough and very extensive search of literature (more than 1,500 paper-based and on-line articles, research papers, books, periodicals, journals, conference papers, surveys, etc) and based on that search, extracted possible items for the measures.

Next, several Internet and e-commerce experts (e-commerce consultants and academics, IT/IS, and Internet/e-commerce executives and managers) read and criticised the statements and clarity of the questionnaire. Revisions of the questionnaire continued in a cyclical fashion until these experts were satisfied that the questionnaire presented the appropriate content for the intended purpose. In addition to that, the questionnaire was pre-tested with the 2nd Focus Group members as a part of this research.

Construct validity refers to the validity of the theory behind the instrument. This study utilised factor analysis to examine the underlying structure of the overall measure. Factor analysis was performed on the 12 e-commerce implementation success items to be able to find out *eigenvalues*. According to the factor analysis, two factors have eigenvalues greater than 1 and can be extracted from the12 e-commerce implementation success items. Table 6.16 presents the eigenvalues of the two factors and discloses that about 73.4 percent of the total variance can be explained by the two extracted factors.

Table 6.16: Factor Statistics for E-Commerce Implementation Success Factors

Factors	Factor Labels	Eigenvalues	Percent of Variance
Factor 1	User-Oriented Improvements	4.743	53.0
Factor 2	E-Commerce System Effectiveness	1.826	20.4
			Total: 73.4

Table 6.17 presents the factor matrix by the items of Internet-based e-commerce implementation success after rotation by the varimax method. *The varimax method is an orthogonal rotation method, which maximises some of the variances of the required loadings of the factor matrix (Hair et al. 1987).*

Based on the matrix, two factors can be extracted. These two factors are interpreted as, or labelled as, '*User-Oriented Improvements*' and '*E-Commerce System Effectiveness*'. The two composed factors appear to be consistent with the literature as the major performance criteria of Internet-based e-commerce implementation success.

Table 6.17: Factor Matrix from Internet-based E-Commerce Implementation Success

Code	Items	Factor 1	Factor 2
Factor 1:	**User-Oriented Improvements**		
Y8	Improvement in internal/external communications	.8716	.2418
Y12	Improving effective decision making/empowerment of users	.8251	.2135
Y7	Improved overall productivity and efficiency of the users	.7928	.1502
Y4	Improvements in product/service and information quality	.7545	.1746
Y1	Improved system availability, flexibility and usefulness	.7292	.2359
Y9	Higher user/customer satisfaction	.7013	.2217
Factor 2 :	**E-Commerce System Effectiveness**		
Y2	Simplified and streamlined business processes	.1369	.8934
Y5	Time savings in e-commerce system operations	.2716	.7425
Y6	Cost savings in e-commerce system operations	.3458	.7132
Y3	Improved speed of product/service cycle	.4329	.6915
Y10	Increased sales, revenues and market share	.5138	.6637
Y11	Enhanced competitive advantage	.5825	.6273

The first composite factor (Factor 1) is labelled "User-Oriented Improvements" and is composed of six items:

1. Improvement in internal/external communications (Y8);
2. Improving effective decision making/empowerment of users (Y12);
3. Improved overall productivity and efficiency of the users (Y7);
4. Improvements in product/service and information quality (Y4)
5. Improved system availability, flexibility and usefulness (Y1); and
6. Higher user/customer satisfaction (Y9).

According to the literature such as Zmud (1979), Ginzberg (1981), Yaverbaum (1988) all suggest that user factors are critical to the performance of IS success. Similarly, Cronin (1994 & 1996); Mougayar (1997); and Kalakota and Whinston (1996 & 1997) indicated that "improvement in internal/external communications", "improvement in effective decision making and empowerment of users ", "improvement in overall productivity and efficiency of the users", "improvements in product/service and information quality", "improvement in system availability,

flexibility and usefulness", and "higher user/customer satisfaction", are critical to the performance of Internet-based e-commerce system. Therefore, these six items are grouped together.

The second factor (Factor 2) is labelled "E-Commerce System Effectiveness" and is also composed of six items:

1. Simplified and streamlined business processes (Y2);
2. Time savings in e-commerce system operations (Y5);
3. Cost savings in E-commerce system operations (Y6);
4. Improved speed of product/service cycle (Y3);
5. Increased sales, revenues and market share (Y10); and
6. Enhanced competitive advantage (Y11).

Hamilton and Chervany (1981a), Miller and Doyle (1987), Raghunathan et al. (1989) and Bergeron et al. (1993) suggest that measurement of system performance and effectiveness is a must for IT/IS success evaluation and included productivity, operations performance, service, etc. for measuring system effectiveness. "Simplified and streamlined business processes (Y2)" and "improvement in speed of product/service cycle (Y3)" can improve a system's performance. Miller and Doyle (1987) and Bergeron et al. (1993) grouped "reduction in users' work, effective execution of tasks", "time savings", "cost-effectiveness of applications", and "low cost applications" into one factor.

Similarly, Cronin (1994, 1996), Mougayar (1997), Kalakota and Whinston (1997) suggested that, "simplified and streamlined business processes", "cost savings in e-commerce business operations", "time savings in e-commerce business operations", "increased sales, revenues and market share", "increased competitive advantage", and "improvement in speed of product/service cycle " are critical variables for Internet-based e-commerce system performance.

Therefore, these six items can be grouped in "E-Commerce System Effectiveness" for further analysis. Factor analysis was also performed on the 88 Internet-based e-commerce implementation activity items. According to the factor analysis, ten factors have eigenvalues greater than 1 and can be extracted from the 88 Internet-based e-commerce implementation activity variables. Table 6.18 presents the eigenvalues of the ten factors and discloses that about 81.3 percent of the total variance can be explained by the ten extracted factors.

Table 6.18: Factor Statistics for E-Commerce Implementation Activities

Factor	Factor Labels	Eigenvalue	Percent of Variance
CSF1	Management Commitment and Support of E-Commerce Implementation	17.561	31.9
CSF2	Organisational and Management Objectives of E-Commerce Implementation	9.332	17.0
CSF3	Communication between Users and the E-Commerce Department	4.786	8.7
CSF4	E-Commerce System Security and Reliability	3.421	6.2
CSF5	E-Commerce Department's Service Function	2.643	4.8
CSF6	Integrating E-Commerce into Existing Business Functions	1.934	3.5
CSF7	Change Management for E-Commerce System	1.452	2.6
CSF8	Appropriate E-Commerce System Applications	1.373	2.5
CSF9	User Participation and Satisfaction for E-Commerce System	1.196	2.2
CSF10	Technological Competence for E-Commerce	1.033	1.9
			Total: 81.3

Table 6.19 presents a factor matrix of the 88 Internet-based e-commerce implementation activity items after varimax rotation. Based on the matrix, the ten factors are labelled by the researcher as:

- Management Commitment and Support for E-Commerce Implementation (CSF1),
- Organisational and Management Objectives for E-Commerce Implementation (CSF2),
- Communication between Users and the E-Commerce Department (CSF3),
- E-Commerce System Security and Reliability (CSF4),
- E-Commerce Department's Service Function (CSF5),

- Integrating E-Commerce into Existing Business Functions (CSF6),
- Change Management for E-Commerce System (CSF7),
- Appropriate E-Commerce System Applications (CSF8),
- User Participation and Satisfaction for E-Commerce System (CSF9), and
- Technological Competence for E-Commerce System (CSF10).

Factor matrix of Internet-based e-commerce implementation activities (Table 6.19) also presents that all of the 88 e-commerce implementation activities have one loading (primary) of greater than .5. Among them, five of the variables (X13, X31, X29, X86 and X21) have secondary loadings of less than .5, but greater than .4. These five variables have been assigned to the factor on which they load the highest.

Table 6.19 also presents four other variables (X76, X47, X75 and X78) load ambiguously on two factors (CSF2 and CSF3); their secondary loadings are greater than .5. Because communication is an organisational and management function, it appears reasonable that two composed factors, "Organisational and Management Objectives for E-Commerce (CSF2)" and "Communication between Users and the E-Commerce Department (CSF3)" are correlated.

For example, "Provide high quality e-commerce databases and Web applications (X76)" is one of the e-commerce department's management functions and clearly should be coordinated through communication with users. Some previous literature (Magal et al. 1988, and Bergeron et al. 1993) grouped similar variables. Following this precedent, these ambiguous variables have been assigned to the factor on which they load the highest. Therefore, "Improve general organisational effectiveness (X47)" and "Provide high quality e-commerce databases and Web applications (X76)" have been assigned to CSF2, "Organisational and Management Objectives for E-commerce". "Provide high quality real-time Web-based e-commerce information and data output (X75)", and "Promote high quality applications for the implemented e-commerce (X78)" have been assigned to CSF3, "Communication between Users and the E-Commerce Department". Table 6.20 also groups the components of the ten factors and presents a partial justification for the labels.

Table 6.19: Factor Matrix for E-Commerce Implementation Activities

	CSF1	CSF2	CSF3	CSF4	CSF5	CSF6	CSF7	CSF8	CSF9	CSF10
X8	.8434	.2453	.1643	.1639	.1318	.1432	.0965	.2365	.1351	.2154
X1	.7816	.1923	.1764	.2612	.2345	.2923	.1719	.1234	.2343	.3454
X6	.7325	.1776	.2813	.1323	.1512	.0816	.2124	.0343	.2432	.1465
X7	.7238	.1203	.0690	.3662	.2321	.1822	.2838	.3154	.1566	-.0354
X43	.6932	.0756	.1352	.0653	.1643	.3473	-.0483	.1321	-.0865	.1387
X4	.6746	.3464	.1558	.2255	.3612	.3031	.1285	-.0765	.2349	.2569
X3	.6484	.2539	.2143	.1279	.1965	.1352	.1956	.2354	.3254	.1258
X2	.6335	.1276	.2417	.2873	.0943	.0597	.2461	.3265	.0324	-.0923
X29	.6118	.0436	.4376	.1443	.3421	.3452	.3531	.1465	.2357	.1354
X58	.5975	.3965	.1436	.2376	.1843	.0865	.1287	.2376	.1154	.1587
X53	.5713	.2741	.1132	.1765	.0365	.2543	.0943	.1254	.0675	.3765
X45	.1429	.8214	.1554	.1643	.1732	.1343	.2154	.0567	.2354	.1357
X82	.1345	.7692	.0563	.1435	.1812	-.0734	.1762	.2435	.1278	.0932
X80	.0835	.7315	.1423	.0361	.1534	.2247	.0991	.1245	.3465	-.1176
X44	.2791	.7069	.2871	.1324	-.0225	.1886	.3083	.3245	.1813	.2143
X46	.1413	.6835	.0314	.1035	.1542	.1673	.1461	.2436	-.0457	.2357
X76	.1552	.6627	.5547	.2123	.1425	.1156	.3142	.1276	.1543	.1328
X47	.5371	.6542	.1692	-.0153	.2971	.0372	.1708	-.0076	.1239	-.0543
X85	.0542	.6219	.1336	.1832	.0811	.2423	.1962	.1435	.0514	.1267
X49	.3255	.6069	.2412	.2314	.1612	.1361	.0465	.1876	.2354	.2764
X42	.1521	.5832	.0765	.1642	.1537	.1424	.2613	.2875	.1937	.1652
X11	.2476	.5624	.1354	.2951	.0841	.1643	.2752	.1876	.1546	.1359
X16	.1245	.1691	.7932	.2381	.1543	.2373	.1243	.0521	.1843	.3456
X14	.2163	.1935	.7715	.1692	.1277	.1416	-.0844	.1874	.1237	.0567
X9	.0832	.0746	.7348	.1235	-.0784	.2597	.1938	.2455	-.0912	.1435
X26	.1457	.1342	.6934	.1923	.1892	.0175	.2826	.1742	.1783	.2861
X13	.2871	.1652	.6838	.1254	.1716	.2132	.2425	.4723	.2769	.1682
X75	.1258	.5386	.6643	.3325	.0584	.2377	.0967	.1391	.1872	-.0867
X10	.0761	.0681	.6539	.0714	.1372	-.0692	.1618	.3143	.0345	.1182
X12	.1557	.2475	.6422	.2453	.2278	.1638	.2952	-.0986	.2176	.2354
X78	.2363	.5661	.6103	.1016	.1693	.2694	.1787	.1823	.1345	.1876
X31	.3791	.4563	.5736	.2452	.2924	.1652	.1623	.0682	.2123	.1284
X67	.1492	.1732	.0813	.7815	.1324	.1252	.1517	.0942	.3541	.1393
X17	.1942	.0721	.2351	.7766	.2871	.3215	-.0352	.1398	.2573	-.0632
X59	.0923	.1216	.1762	.7321	.3345	.1831	.1457	.2355	.2831	.1374
X60	.1239	.2348	.1285	.6883	.1468	-.0586	.1592	.1582	.0563	.2442
X62	.3461	.1458	.2354	.6745	.0821	.1657	.1164	.1237	.1324	.2131
X63	.2782	.2871	.2791	.6534	.1378	.2138	.2387	.2765	.2153	.1894
X64	.0632	.0351	.0631	.6328	.2187	.1347	.3428	.3254	.1567	.0456
X66	.1346	.1192	.1982	.6239	.1234	.2761	.0824	-.0532	-.0214	.1835
X61	.1789	.1673	.2265	.6013	.0346	.0925	.1547	.1575	.1692	.2932
X65	.2671	.1427	.1873	.5805	.2249	.1742	.2463	.1298	.0159	.1362

Table 6.19: Continued...

	CSF1	CSF2	CSF3	CSF4	CSF5	CSF6	CSF7	CSF8	CSF9	CSF10
X30	.1532	.1572	.1031	.1732	.7982	.1427	0432	.1325	2256	.1543
X32	.2943	.1721	.2922	.1475	.7743	.0923	.1745	.2344	-.0332	2442
X5	.0464	.0466	.1345	.0323	.7618	.1854	.2127	.1436	.2414	-.0461
X88	.1201	.1376	.2154	.2734	.7432	.2322	.1836	-.0651	.1563	2544
X23	.1375	.1125	.0852	.1656	.7143	.1572	-.0408	.2351	2394	.1964
X33	.1943	.3231	.1358	.1775	.6728	.2614	2584	.1529	.0342	2483
X35	.0472	.0242	.0727	.2829	.6433	.0563	.1365	.1843	.2756	.0728
X15	.2437	.1328	.2013	.0553	.5752	.1569	3267	2354	.1563	.1493
X34	.1624	.2762	.3231	.1852	.5679	.2057	.1275	.0846	3413	.2476
X41	.2165	.0143	.2598	.2406	.0371	.7734	.1954	.2398	1832	2242
X37	.1423	.1594	.0783	.1813	.1918	.7685	2366	.1834	.0932	1404
X36	.0265	.2413	.2654	-.0244	.1522	.7532	.1592	-.0253	.2343	-.0675
X39	.1992	.1675	.1862	.2475	.2384	.7239	.2387	.1787	2456	1546
X38	.1418	.0309	.1514	.0326	.0495	.6813	.0336	2366	.1167	2265
X40	.1376	.1816	.0248	.1592	.1456	.6552	.2835	.0843	3142	.1737
X69	.0356	.2475	.2716	.1733	.3272	.6309	.0937	.1678	.9523	.0358
X48	.1741	.1263	.1634	.2746	.2137	.5786	.2354	2171	-.0451	1543
X50	.1782	.0453	.1642	.1982	.2176	.1413	.7815	.2124	-.0651	.1128
X54	.0876	.1512	.2265	.0381	.1854	.2309	.7452	.1402	.1294	.0.271
X52	.2133	.2064	.1824	.2316	.2176	.0644	.7354	.0326	.1369	.1272
X51	.1254	.1823	-.0223	.1357	.0465	.1873	.7114	.1327	.1761	2387
X56	.2843	.2394	.2376	-.0934	.3721	1549	.6798	.1792	0468	.1928
X55	.1529	.0345	.3541	.1672	1324	.2487	6625	3256	1562	-.1652
X57	.0365	.1354	.2187	.2654	.2741	.2125	6247	.1936	2365	2138
X74	.2747	.2276	.1363	.1832	-.0572	.1982	.5801	.0954	2137	1329
X77	.1564	.2138	-.0453	.1623	.2635	.1404	.2618	.7749	2314	0237
X83	.1673	.1572	.1235	.1546	.1732	-.1246	.1524	7512	2391	1253
X79	.2691	.1257	.2694	.1208	.1443	.0642	0836	.7323	1825	1416
X24	.1768	.2453	.2187	.0471	1821	.2176	.1256	.7204	.1328	-.0639
X84	.0345	.2761	.0467	.1528	.0216	2314	.2134	.6823	2176	.1327
X81	.2349	.0371	.1632	.2149	.1316	.0435	2254	6714	.0924	2143
X87	.1276	.1659	.1328	.1317	.1725	.1529	2721	.6292	.1639	2236
X86	.0265	.4187	.2519	.1626	.1237	.1442	1327	.5634	.1325	.1629
X25	.1734	.2317	.1924	.1782	2582	.1739	.0452	1935	.7828	.1345
X27	.1992	.2305	.2282	.1817	.2173	.1843	.1744	2143	.7412	.1526
X22	.1327	.1824	.1293	-.0376	.1992	.2244	.1962	.1768	.7329	2143
X18	.0423	.2351	.2817	.1524	.1354	.1936	-.0354	2354	.7118	2258
X20	.1263	.1705	.0724	.3616	-.0662	.1513	.1815	2571	.7007	.1624
X28	.2458	.1683	.2532	.2592	.1613	-.0952	.1392	.1548	6525	1482
X19	.1782	.2124	.1015	.1622	.2624	.1794	.2271	.1427	.6314	.2643
X21	.0986	.1031	.4264	.2913	.0145	.1625	.1283	.2521	5468	.3375
X73	.1495	.2118	.1686	.2872	.0562	.3248	.1635	.1387	.1946	.7318
X68	.0356	.1432	.2321	.1783	.1983	.2981	-.0376	2376	2398	.7127
X70	.1234	.0286	-.0259	.1548	.1654	.0658	.1783	.1658	3217	.6943
X72	.3291	2143	.2983	.0763	.1198	.1369	.1243	.1327	.2019	6421
X71	.1543	.1324	.1457	.1836	.2136	1825	.2659	-.0659	.1824	5339

Table 6.20: Components of the Ten Critical Success Factors

CSF1: Management Commitment and Support for E-Commerce	
X1	Top management's sufficient understanding about the goals of e-commerce system implementation
X2	Promote acceptance of the e-commerce implementation concept to the whole firm
X3	Promote support of top management for the e-commerce implementation concept
X4	Design a strategic e-commerce system implementation planning
X6	Top management involvement in the e-commerce implementation efforts and processes
X7	Successful management leadership for implementation efforts
X8	Commitment and support of management to the e-commerce implementation concept
X29	Provide competent e-commerce staff
X43	Attain organisational objectives and strategy for e-commerce system implementation
X53	Provide necessary changes in the human resource policies for implementation
X58	Facilitate the management of change
CSF2: Organisational and Management Objectives for E-Commerce	
X11	Provide coordination through communication of corporate or business departments
X42	Organisational acceptance of e-commerce concept
X44	Provide clearly defined on-line business plan
X45	Improve organisational effectiveness and performance
X46	Increase the quality of decision making
X47	Improve general organisational effectiveness
X49	Adequate organisational commitment and effectiveness
X76	Provide high quality e-commerce databases and Web applications
X80	Reduce the business processing; data and maintenance cycle
X82	Improve the efficiency of e-commerce system applications for users
X85	Promote applications that make e-commerce system business process easier
CSF3: Communication Between Users and E-Commerce Department	
X9	Communicate with users about e-commerce procedures and services
X10	Provide effective communication among the organisational units
X12	Communicate with e-commerce users
X13	Provide training to e-commerce staff and users
X14	Respond to user's request for e-commerce system support
X16	Providing reliable and consistent communication and facilitations to all relevant units
X26	Provide users' understanding of the implemented e-commerce system
X31	Manage e-commerce resources effectively and efficiently
X75	Provide high quality real-time Web-based e-commerce information and data output
X78	Promote high quality applications for the implemented e-commerce
CSF4: E-Commerce System Security and Reliability	
X17	Improve users' confidence in the e-commerce system
X59	Determine, implement and control overall Internet/e-commerce system security needs
X60	Provide clearly stated Internet security policy, standards and adequate user training on the security issues
X61	Provide secure electronic payments infrastructure and convenient delivery mechanism
X62	Provide and ensure adequate user privacy and confidentiality
X63	Provide overall e-commerce system network and data transaction security, data and database integrity
X64	Provide and ensure overall e-commerce system reliability
X65	Provide a reliable Internet Service Provider (ISP) and Web server to access quickly and securely.
X66	Provide quick system access availability and reliable information on time

Table 6.20: Continued...

X67	Provide secure and reliable Internet/e-commerce system
CSF5: E-Commerce Department's Service Function	
X5	Promote users' commitment and support for the e-commerce system implementation concept
X15	Provide information and data sharing among the organisational units
X23	Satisfy user's expectations of the e-commerce system
X30	Develop and provide a basis for control of e-commerce system guidelines, standards and policies, etc.
X32	Provide reliable and qualified e-commerce services, enabling tools and education (training)
X33	Facilitate an increase in the productivity of users and their business processes.
X34	Provide adequate control for e-commerce system implementation and plan for maintenance and its costs
X35	Providing the organisational units with information for 24 hours a day and seven days a week
X88	Provide and promote flexible, adequate, and appropriate applications for e-commerce system implementation
CSF6: Integrating E-Commerce into Existing Business Functions	
X36	Provide e-commerce system integration with ongoing (existing) business processes
X37	Provide seamless integration of all supply chain processes and measurements
X38	Integrate e-commerce system with all internal operation functions (eg order processing)
X39	Integrate e-commerce system with all external operation functions (eg customers, suppliers)
X40	Enhance firm's value-chain integration with e-commerce system
X41	Provide a high degree of e-commerce integration and consistency across the infrastructure, networks, databases and overall business processes
X48	Presence of a dedicated organisational structure
X69	Sufficient understanding about existing data, applications and e-commerce across the organisation
CSF7: Change Management for E-Commerce System Implementation	
X50	Recognise needs for managing change
X51	Sufficient anticipation and planning for organisational resistance to change
X52	Gain cross-functional cooperation for organisational change
X54	Communicate reasons for change to members of the organisation
X55	Provide appropriate employee compensation incentives and training in the new process
X56	Set reasonable expectations attributed to implementation as a solution for all organisational problems
X57	Organisation's ability to cultural and structural transformation for the new system
X74	Ability of the organisation to identify, activate and coordinate its technological and human resources
CSF8: Appropriate E-Commerce System Applications	
X24	Ease the use of e-commerce system tools for users
X77	Select and install quality hardware and the right e-commerce software solution for the intended business operations
X79	Provide up-to-date information content on Web site as part of e-commerce value-added services
X81	Provide efficient data transaction; convenient and widely accepted e-commerce payment system
X83	Provide flexible and user friendly (ease-of-use) e-commerce system applications
X84	Provide availability and easy access to e-commerce system for 24 hours a day 7 days a week
X86	Promote e-commerce system applications that provide competitive edge for the firm
X87	Provide flexible and convenient data transaction and payment methods

Table 6.20: Continued...

CSF9: User Participation and Satisfaction for E-Commerce Implementation	
X18	Improve access (easier and quicker) to the e-commerce system
X19	Improve user productivity by realisation of user requirements
X20	Permit control over e-commerce services by users
X21	Generate user satisfaction with the implemented e-commerce system
X22	Increase the use of implemented e-commerce systems
X25	Provide users' positives attitudes toward e-commerce system implementation
X27	Provide users' participation in the e-commerce system implementation
X28	Involve users in e-commerce system implementation
CSF10: Technological Competence for E-Commerce Implementation	
X68	Adequate e-commerce application infrastructure (eg. reliable telecommunications network)
X70	Satisfactory to continually assess emerging Internet/e-commerce capabilities
X71	Level of Internet/e-commerce system knowledge, experience and expertise
X72	Adequacy of e-commerce-related knowledge and skills of users and managers throughout the organisation
X73	Level of technological readiness and access to technical competence (eg. hardware, software, and human resources components, etc)

Table 6.21 shows a mapping of the ten factors of this research with Rockart's CSF and Martin's CSF. The table is meant to show that the ten factors of this research can be subjectively mapped consistently with Rockart's CSF and Martin's CSF, and consequently these factors are appropriately used for further analysis.

Table 6.21: Mapping the Ten Factors with Rockart's and Martin's CSF

Rockart's CSF	Martin's CSF	Gide's CSFs
Service (Operations and Development)	Data Processing Operations System Development	▪ Appropriate E-Commerce System Applications ▪ Integrating E-Commerce into Existing Business Functions
Communication between Users and the IS Staff	Relationships with the Management of the Parent Organisation	▪ Communication between Users and the E-Commerce Department ▪ User Participation and Satisfaction
Human Resources	Human Resources Development	▪ E-Commerce Department's Service Function
Re-positioning the IS Function (Technical) (Organisational) (Psychological) (IS Managerial)	Support of Objectives and Priorities of the Parent Organisation Management of Change (Technological) Management Control of the IS/DP Organisation	▪ Management Commitment and Support for E-Commerce Implementation ▪ Organisational and Managerial Objectives for E-Commerce ▪ E-Commerce System Security and Reliability ▪ Management Change for E-Commerce ▪ Technological Competence for E-Commerce Implementation

6.4.3 Posterior Reliability Test

After factor analysis, reliability tests were performed on the two composite factors of Internet-based e-commerce implementation success and on the ten composite factors of Internet-based e-commerce implementation activities. Table 6.22 presents coefficient alphas for the two groups of factors. None of the twelve composite factors' coefficient alpha was lower than .7543. Consequently, these factors provide a reliable and consistent measure of intended dimension and no further elimination of variables appeared necessary.

Table 6.22: Coefficient Alpha for the Extracted Factors

Factors (items)	Alpha
Internet-based E-Commerce Implementation Success	
User-Oriented Improvements (Y1, Y4, Y7, Y8, Y9, Y12)	.9163
E-Commerce System Effectiveness (Y2, Y3, Y5, Y6, Y10, Y11)	.8457
Internet-based E-Commerce Implementation Activities	
Management Commitment and Support for E-Commerce Implementation (X1, X2 X3, X4, X6, X7, X8, X29, X43, X53, X58)	.9445
Organisational and Managerial Objectives for E-Commerce Operations (X11, X42, X44, X45, X46, X47, X49, X76, X80, X82, X85)	.9162
Communication Between Users and the E-Commerce Department (X9, X10, X12, X13, X14, X16, X26, X31, X75, X78)	.8927
E-Commerce System Security and Reliability (X17, X59, X60, X61, X62, X63, X64, X65, X66, X67)	.8738
E-Commerce Department's Service Function (X5, X15, X23, X30, X32, X33, X34, X35, X88)	.8512
Integrating E-Commerce into Existing Business Functions (X36, X37, X38, X39, X40, X41, X48, X69)	.8346
Change Management for E-Commerce System Implementation (X50, X51, X52, X54, X55, X56, X57, X74)	.8279
Appropriate E-Commerce System Applications (X24, X77, X79, X81, X83, X84, X86, X87)	.8124
User Participation and Satisfaction for E-Commerce Implementation (X18, X19, X20, X21, X22, X25, X27, X28)	.7732
Technological Competence for E-Commerce Implementation (X68, X70, X71, X72, X73)	.7543

6.5 HYPOTHESES TESTING

The hypotheses were tested using the canonical correlation analysis. Hair et al. (1987) recommended three criteria to be used for interpreting the canonical function. These are:

- the canonical correlation;
- the significance level of the F-statistic; and
- the redundancy index.

This study used the canonical correlation analysis of SPSS (Statistical Package for Social Science) and inspected these three criteria. For the canonical correlation, this study examined the correlation between dependent and canonical variables from SPSS results. For the canonical function, this study examined several multi-variate F-statistics that were provided by SPSS results; such as Pillais' F-test for the canonical function. For each dependent (criterion) variable, the uni-variate F-tests and Roy-Bargman step-down F-tests from the SPSS results were examined. For the redundancy index, this study used the SPSS results and calculated the redundancy index according to the formula suggested by Hair et al. (1987). The calculation of the redundancy index is a two-step approach:

- calculate the amount of shared variance in the criterion set that is explained by the criterion canonical variate;
- calculate the amount of variance in the criterion canonical variance that can be explained by the predictor set canonical variate (that is the square of the canonical correlation).

The redundancy index was then calculated by multiplying these two components. The canonical loadings for each hypothesis tested were also examined. This study employed two approaches for hypotheses testing. The first approach was to inspect the original ten groups of hypotheses as discussed in Chapter 5. The second approach was to examine the ten factors extracted from analysis. Both approaches are presented in the following sections.

6.5.1 Hypotheses Testing of the Original Ten Sets

For the canonical correlation analysis purposes, the criterion (dependent) variables are calculated from the e-commerce implementation success variables. The predictor (independent) variables are represented by the e-commerce implementation activity variables.

There are two criterion variables used for each hypothesis test. The twelve Internet-based e-commerce implementation success variables are grouped into two criterion variables according to the factor analysis results.

The first criterion variable, coded as SFAC1, is the mean of the six Internet-based e-commerce implementation success variables that were extracted into the first factor by factor analysis. The first factor was labelled "*User-Oriented Improvements*". Table 6.23 shows the factor loadings for these six variables. The factor loadings ranged from .701 to .872.

Table 6.23: Factor Loading for SFAC1

Code	User-Oriented Improvements Variables	Factor Loading
Y8	Improvement in internal/external communications	.872
Y12	Improving effective decision making/empowerment of users	.825
Y7	Improvement in overall productivity and efficiency of the users	.793
Y4	Improvements in product/service and information quality	.755
Y1	Improvement in system availability, flexibility and usefulness	.729
Y9	Higher user/customer satisfaction	.701

The second criterion variable, coded as SFAC2, is the mean of the other six Internet-based e-commerce implementation success variables that were extracted into the second factor by factor analysis. This factor was labelled "*E-Commerce System Effectiveness*". Table 6.24 shows the factor loadings for these six variables. The factor loadings ranged from .627 to .893.

Table 6.24: Factor Loading of SFAC2

Code	E-Commerce System Effectiveness Variables	Factor Loading
Y2	Simplified and streamlined business processes	.893
Y5	Time savings in e-commerce system operations	.743
Y6	Cost savings in e-commerce system operations	.713
Y3	Improved speed of product/service cycle	.692
Y10	Increased sales, revenues and market share	.664
Y11	Enhanced competitive advantage	.627

6.5.1.1 Hypotheses Testing One

The 1st hypothesis is that commitment and support from the top management will be positively related to Internet-based e-commerce implementation success. The key to successful implementation of Internet-based e-commerce is top management's deep and lasting commitment and support. Without support from the top management and their willingness to make investments, it is impossible for e-commerce projects to be approved. Because top managers have strategic point of view, it may be easy to convince them to buy long-term benefits of the e-commerce system. It requires a solid corporate commitment, with a case for action that is firmly endorsed by senior management.

Further, top management who actively participate in the e-commerce implementation planning process, will understand Internet-based e-commerce implementation concepts better and be more likely to support e-commerce implementation. Their commitment and support for e-commerce will impact the success of e-commerce implementation. The hypothesis statements are:

Ho: *Commitment and support from top management and users are not related to Internet-based e-commerce implementation success.*

H1: *Commitment and support from top management and users are related to Internet-based e-commerce implementation success.*

The eight e-commerce implementation activity variables (predictors) for testing this hypothesis are:

X1: Top management's sufficient understanding about the goals of e-commerce system implementation;

X2: Promote acceptance of the e-commerce implementation concept to the whole firm;

X3: Promote support of top management for the e-commerce implementation concept;

X4: Design a strategic e-commerce system implementation planning;

X5: Promote users' commitment and support for the e-commerce system implementation concept;

X6: Top management involvement in the e-commerce implementation efforts and processes;

X7: Successful management leadership for implementation efforts; and

X8: Commitment and support of management to the e-commerce implementation concept.

Table 6.25 presents the results for management commitment and support. The canonical correlations are high, .975 and .753, and indicate that the bivariate correlation between the two linear composite (Internet-based e-commerce implementation success and the eight Internet-based e-commerce implementation activities) is high. The significance level for the F-statistic is less than .000. The cumulative redundancy index is .901 and indicates that 90.1 percent of the variance in SFAC1 and SFAC2 has been explained by the canonical variables. The canonical loadings are high in each canonical function.

These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. *The results indicated that commitment and support from top management and users are related to Internet-based e-commerce implementation success.*

Table 6.25: The Canonical Correlation for Management Commitment and Support

Criterion (E-Commerce Implementation Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.975	.000	.769
SFAC2	.753	.000	.132
			Total: .901

Predictor (E-Commerce Implementation Activities)		Canonical Loading 1	2
X1:	Top management's sufficient understanding about the goals of e-commerce system implementation	.851	.573
X2:	Promote acceptance of the e-commerce implementation concept to the whole firm	.714	.612
X3:	Promote support of top management for the e-commerce implementation concept	.836	.526
X4:	Design a strategic e-commerce system implementation planning	.573	.324
X5:	Promote users' commitment and support for the e-commerce system implementation concept	.844	-.257
X6:	Top management involvement in the e-commerce implementation efforts and processes	.862	.542
X7:	Successful management leadership for implementation efforts	.779	.376
X8:	Commitment and support of management to the e-commerce implementation concept	.871	-.253

6.5.1.2 Hypotheses Testing Two:

The 2nd group of hypotheses implies the importance of communication, training and facilitation between the users and the e-commerce department. Through communication and coordination, an e-commerce department can provide appropriate training and facilities to users. This hypothesis has one subset hypothesis. The subset hypothesis statements are:

Ho: *Training and facilitation to users is not related to Internet-based e-commerce implementation success.*

H2a: *Training and facilitation to users is related to Internet-based e-commerce implementation success.*

The three predictors for the canonical correlation are:

X13: Provide training to e-commerce staff and users;

X14: Respond to user's request for e-commerce system support; and

X15: Provide information and data sharing among the organisational units.

Table 6.26 shows the results for training and facilitation to users. The canonical correlations are high, .963 and .775, and indicate that the bivariate correlation between the two linear composites (e-commerce implementation success and the three e-commerce implementation activities) is high. The significance level for the F-statistic is less than .000. The cumulative redundancy index is .868, and indicates that 86.8 percent of the variance in SFAC1 and SFAC2 has been explained by the canonical variate for the three e-commerce implementation activity variables. The canonical loadings are high in each canonical function. These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. *Thus, training and facilitation to users is related to Internet-based e-commerce implementation success.*

Table 6.26: The Canonical Correlation for Training and Facilitation to Users

Criterion (E-Commerce Implementation Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.963	.000	.712
SFAC2	.775	.000	.156
			Total .868
Predictor (E-Commerce Implementation Activities)			Canonical Loading 1 2
X13: Provide training to e-commerce staff and users			.805 .572
X14: Respond to user's request for e-commerce system support			.873 -.368
X15: Provide information and data sharing among the organisational units			.767 .543

Next, five other variables (X9, X10, X11, X12, and X16) were added to this subset (a total of eight variables) and the two criterion variables were analysed by the canonical correlation analysis for the second general hypothesis. This hypothesis tested the relationship of communication between users and the e-commerce department for e-commerce implementation success. The hypothesis statements are:

Ho: *Communication between users and the e-commerce department is not related to Internet-based e-commerce implementation success.*

H2: *Communication between users and the e-commerce department is related to Internet-based e-commerce implementation success.*

The eights predictors for the canonical correlation are:

X9: Communicate with users about e-commerce procedures and services;
X10: Provide effective communication among the organisational units;
X11: Provide coordination through communication of corporate or business departments;
X12: Communicate with e-commerce users;
X13: Provide training to e-commerce staff and users;
X14: Respond to user's request for e-commerce system support;
X15: Provide information and data sharing among the organisational units; and
X16: Providing reliable and consistent communication and facilitations to all relevant units

Table 6.27 shows the results for communication between users and the e-commerce department. The canonical correlations are high, .951, and .793, and indicate that the bivariate correlation between the two linear composites (e-commerce implementation success and the eight Internet-based e-commerce implementation activities) is high. The significance level for the F-statistic is less than .000. The cumulative redundancy index is .837, and indicates that 83.7 percent of the variance in SFAC1 and SFAC2 has been explained by the canonical variate for the eight e-commerce implementation activity variables. The canonical loadings are high in each canonical function.

These results indicate that the null hypothesis is rejected at the significance level of .000, supported. *Thus, communication between users and the e-commerce department is related to Internet-based e-commerce implementation success.*

Table 6.27: The Canonical Correlation for Communication between Users and the E-Commerce Department

Criterion (E-Commerce Implementation Success)		Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1		.951	.000	.614
SFAC2		.793	.000	.223
				Total: .837
Predictor (E-Commerce Implementation Activities)				Canonical Loading 1 2
X9:	Communicate with users about e-commerce procedures and services			.801 .472
X10:	Provide effective communication among the organisational units			.763 .234
X11:	Provide coordination through communication of corporate or business departments			.757 .312
X12:	Communicate with e-commerce users			.823 .326
X13:	Provide training to e-commerce staff and users			.714 .463
X14:	Respond to user's request for e-commerce system support			.872 .542
X15:	Provide information and data sharing among the organisational units			.745 .234
X16:	Providing reliable and consistent communication and facilitations to all relevant units			.913 .063

6.5.1.3 Hypotheses Testing Three:

The 3rd group of hypotheses deals with the relationship between user appreciation and Internet-based e-commerce implementation success. It has two subset hypotheses. The first subset hypothesis examines user involvement and the second examines user attitudes. The first subsets of hypothesis statement are:

Ho: *User involvement in the process of the e-commerce implementation is not related to Internet-based e-commerce success.*

H3a: *User involvement in the process of e-commerce implementation is related to Internet-based e-commerce success.*

The three e-commerce implementation activity variables for testing this hypothesis are:

X26: Provide users' understanding of the implemented e-commerce system;
X27: Provide users' participation in the e-commerce system implementation ; and
X28: Involve users in e-commerce system implementation.

These three variables are the predictor variables for the canonical correlation analysis. The canonical correlation analysis was performed on the two criterion variables, SFAC1 and SFAC2, and three predictor variables X26, X27 and X28.

Table 6.28 shows the results of the canonical correlation analysis for user involvement. The canonical correlations are high, .946 and .751, and indicate that the bivariate correlation between the two linear composites (e-commerce implementation success and the three e-commerce implementation activities) is high. The significance level for the F-statistic is less than .000. The cumulative redundancy index is .774, and indicates that 77.4 percent of the variance in SFAC1 and SFAC2 has been explained by the canonical variate for the three Internet-based e-commerce implementation activity variables. The canonical loadings are high in each canonical function. These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. *Thus, user involvement in the process of e-commerce implementation is related to Internet-based e-commerce system success.*

Table 6.28: The Canonical Correlation for User Involvement in Implementation

Criterion (E-Commerce Implementation Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.946	.000	.371
SFAC2	.751	.000	403
			Total: .774
Predictor (E-Commerce Implementation Activities)			Canonical Loading 1 2
X26: Provide users' understanding of the e-commerce system			.354 .795
X27: Provide users' participation in the e-commerce system Implementation			.812 .461
X28: Involve users in e-commerce system implementation			.836 .154

The second subset hypothesis tested users' attitude toward e-commerce implementation, which is related to e-commerce system implementation success. The hypothesis statements for this subset are:

Ho: *Users' attitude toward e-commerce implementation is not related to Internet-based e-commerce implementation success.*

H3b: *Users' attitude toward e-commerce implementation is related to Internet-based e-commerce implementation success.*

There are four variables of Internet-based e-commerce implementation activities for this hypothesis testing. These are:

X22: Increase the use of implemented e-commerce systems;
X23: Satisfy user's expectations of the e-commerce system;
X24: Ease the use of e-commerce system tools for users; and
X25: Provide users' positives attitudes toward e-commerce system implementation.

These four variables are the predictor variables for the canonical correlation analysis. The canonical correlation analysis was performed on the two criterion variables, SFAC1 and SFAC2, and these four Internet-based e-commerce implementation activity variables, X22, X23, X24 and X25.

Table 6.29 shows the results of the canonical correlation analysis for user attitude. The canonical correlations are high, .973 and .735, and indicate that the bivariate correlation between the two linear composites (e-commerce implementation success and the four Internet-based e-commerce implementation activities) is high. The significance level for the F-statistic is less than .000. The cumulative redundancy index is .884, and indicates that 88.4 percent of the variance in SFAC1 and SFAC2 has been explained by the canonical variate for the four Internet-based e-commerce implementation activity variables. The canonical loadings are high in each canonical function. These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. *Thus, user's attitude toward e-commerce implementation is related to Internet-based e-commerce system implementation success.*

Table 6.29: The Canonical Correlation of User Attitude for E-Commerce

Criterion (E-Commerce Implementation Success)		Canonical Correlation	Significance of F-Statistic	Redundancy Index	
SFAC1		.973	.000		.771
SFAC2		.735	.000		.113
				Total:	.884
Predictor (E-Commerce Implementation Activities)				Canonical Loading 1	2
X22:	Increase the use of implemented e-commerce system			.892	233
X23:	Satisfy user's expectations of the e-commerce system			.761	-.144
X24:	Ease the use of e-commerce system tools for users			.803	215
X25:	Provide users' positives attitudes toward e-commerce system implementation			.719	.473

Next, the variables from these two subsets plus five other variables, X17, X18, X19, X20 and X21, (a total of twelve variables) and the two criterion variables were analysed by the canonical correlation analysis for the 3rd general hypothesis. This hypothesis tested that user appreciation and Internet-based e-commerce implementation success are positively related. The hypothesis statements are:

Ho: *User appreciation is not related to Internet-based e-commerce implementation success.*

H3: *User appreciation is related to Internet-based e-commerce implementation success.*

The twelve e-commerce implementation activity variables for testing this hypothesis are:

X17: Improve users' confidence in the e-commerce system;
X18: Improve access (easier and quicker) to the e-commerce system.
X19: Improve user productivity by realisation of user requirements;
X20: Permit control over e-commerce services by users;
X21: Generate user satisfaction with the implemented e-commerce system.
X22: Increase the use of implemented e-commerce systems;
X23: Satisfy user's expectations of the e-commerce system;
X24: Ease the use of e-commerce system tools for users;
X25: Provide users' positives attitudes toward e-commerce system implementation;
X26: Provide users' understanding of the implemented e-commerce system,
X27: Provide users' participation in the e-commerce system implementation; and
X28: Involve users in e-commerce system implementation.

Table 6.30 shows these twelve predictor variables and the results of the canonical correlation analysis for user appreciation. The canonical correlations are high, .981 and .673, and indicate that the bivariate correlation between the two linear composites (e-commerce implementation success and the twelve Internet-based e-commerce implementation activities) is high. The significance level for the F-statistic is less than .000. The cumulative redundancy index is .873, and indicates that 87.3 percent of the variance in SFAC1 and SFAC2 has been explained by the canonical variate for the twelve Internet-based e-commerce implementation activity variables. The canonical loadings are high in each canonical function. These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. *Thus, user appreciation is positively related to Internet-based e-commerce implementation success.*

Table 6.30: The Canonical Correlation for User Appreciation of the E-Commerce

Criterion (E-Commerce Implementation Success)		Canonical Correlation	Significance of F-Statistic	Redundancy Index	
SFAC1		.981	.000		.748
SFAC2		.673	.000		125
				Total:	873
Predictor (E-Commerce Implementation Activities)				Canonical Loading 1	2
X17:	Improve users' confidence in the e-commerce system			.614	.223
X18:	Improve access (easier and quicker) to the e-commerce system			.801	-.183
X19:	Improve user productivity by realisation of user requirements			.718	-.216
X20:	Permit control over e-commerce services by users			.673	438
X21:	Generate user satisfaction with the implemented e-commerce System			.575	-.336
X22:	Increase the use of implemented e-commerce systems			.479	- 264
X23:	Satisfy user's expectations of the e-commerce system			.612	-.152
X24:	Ease the use of e-commerce system tools for users			.526	-.305
X25:	Provide users' positives attitudes toward e-commerce system Implementation			.638	.196
X26:	Provide users' understanding of the implemented e-commerce System			.741	-.245
X27:	Provide users' participation in the e-commerce system implementation			.682	.326
X28:	Involve users in e-commerce system implementation			.325	-.673

6.5.1.4 Hypotheses Testing Four:

The 4th hypothesis suggests an e-commerce department should support users' needs. An effective e-commerce department should provide the required hardware and software applications (facilities) to users. Also, an e-commerce department staff should competent to provide the internal services and consulting in support of the Internet-based e-commerce business operations of the firm. An e-commerce department should provide training courses to users for updating and improving Internet and e-commerce related knowledge and skills applicable for e-commerce system implementation. Based on these points, the hypothesis statements are:

Ho: *The support services of an e-commerce department are not related to e-commerce implementation success.*

H4: *The support services of an e-commerce department are related to e-commerce implementation success.*

The seven e-commerce implementation activity variables for testing this hypothesis are:

X29 Provide competent e-commerce staff,
X30 Develop and provide a basis for control of e-commerce system guidelines, standards and policies, etc.;
X31 Manage e-commerce resources effectively and efficiently,
X32 Provide reliable and qualified e-commerce services, enabling tools and education (training),
X33 Facilitate an increase in the productivity of users and their business processes,
X34 Provide adequate control for e-commerce system implementation and plan for maintenance and its costs; and
X35 Providing the organisational units with information for 24 hours a day and seven days a week.

Table 6.31 presents the results for the e-commerce department's support services. The canonical correlations are high, .973, and .738, and indicate that the bivariate correlations between the e-commerce implementation success and the seven Internet-based e-commerce implementation activities are high. The significance level for the F-statistic is less than .000. The cumulative redundancy index is .863, and indicates that 86.3 percent of the variance in SFAC1 and SFAC2 has been explained by the canonical variate for the seven Internet-based e-commerce implementation activity

variables. The canonical loadings are high in each canonical function. These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. *Thus, the support services of an e-commerce department are related to e-commerce implementation success.*

Table 6.31: The Canonical Correlation for E-Commerce Department Services

Criterion (E-Commerce Implementation Success)		Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1		.973	.000	.711
SFAC2		.738	.000	.152
				Total: .863
Predictor (E-Commerce Implementation Activities)				Canonical Loading 1 2
X29	Provide competent e-commerce staff			.632 -.421
X30	Develop and provide a basis for control of e-commerce system guidelines, standards and policies, etc.			.712 .215
X31	Manage e-commerce resources effectively and efficiently			.783 .469
X32	Provide reliable and qualified e-commerce services, enabling tools and education (training)			.878 -.381
X33	Facilitate an increase in the productivity of users and their business processes.			.645 -.287
X34	Provide adequate control for e-commerce system implementation and plan for maintenance and its costs			.713 .163
X35	Providing the organisational units with information for 24 hours a day and seven days a week			.816 -.372

6.5.1.5. Hypotheses Testing Five:

The 5th hypothesis suggests that successful implementation of Internet-based e-commerce is positively related to integration of e-commerce system into organisations' existing internal and external business functions and operations. The goal - what e-commerce really means for business - is the integration of processes that span companies, geography, and business functions. For virtual and traditional companies alike, the successful implementation of Internet-based e-commerce depends on the ability of integrating internal e-commerce business operations with suppliers, business partners, distributors and loyal customers all along the supply chain.

For companies, integrating e-commerce system with supply chains is a critical part of realising full benefits of e-commerce. Based on these points, the hypothesis statements are:

Ho: *Integration of e-commerce system into existing business functions is not related to Internet-based e-commerce implementation success.*

H5: *Integration of e-commerce system into existing business functions is related to Internet-based e-commerce implementation success.*

The six e-commerce implementation activity variables for testing this hypothesis are:

X36: Provide e-commerce system integration with ongoing (existing) business processes;
X37: Provide seamless integration of all supply chain processes and measurements;
X38: Integrate e-commerce system with all internal operation functions (eg. order processing);
X39: Integrate e-commerce system with all external operation functions (eg. customers, suppliers),
X40: Enhance firm's value-chain integration with e-commerce system; and
X41: Provide a high degree of e-commerce integration and consistency across the infrastructure, networks, databases and overall business processes.

Table 6.32 presents the results for the integration of the e-commerce systems. The canonical correlations are high, .945, and .782, and indicate that the bivariate correlations between the e-commerce implementation success and the six Internet-based e-commerce implementation activities are high. The significance level for the F-statistic is less than .000. The cumulative redundancy index is .871, and indicates that 87.1 percent of the variance in SFAC1 and SFAC2 has been explained by the canonical variate for the six Internet-based e-commerce implementation activity variables. The canonical loadings are high in each canonical function.

These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. *Thus, the integration of e-commerce system into the existing business functions (internal and external) is positively related to Internet-based e-commerce implementation success.*

Table 6.32: The Canonical Correlation for E-Commerce Integration

Criterion (E-Commerce Implementation Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.945	.000	.687
SFAC2	.782	.000	.184
			Total: .871

Predictor (E-Commerce Implementation Activities)		Canonical Loading 1	2
X36:	Provide e-commerce system integration with ongoing (existing) business processes	.812	.473
X37:	Provide seamless integration of all supply chain processes and Measurements	.775	-.215
X38:	Integrate e-commerce system with all internal operation functions	.693	.469
X39:	Integrate e-commerce system with all external operation functions	.855	-.281
X40:	Enhance firm's value-chain integration with e-commerce system	.714	.287
X41:	Provide a high degree of e-commerce integration and consistency across the infrastructure, networks, databases and overall business processes	.803	-.172

6.5.1.6. Hypotheses Testing Six:

The 6th hypothesis suggests that Internet-based e-commerce implementation success is related to overall organisational effectiveness. For successful implementation of an Internet-based e-commerce system, a clear organisational and management objectives toward the e-commerce system implementation is a must. On the other hand, as e-commerce system implementation can support organisational objectives and priorities, organisational performance and managerial decision making should be improved. Based on these points, the hypothesis statements are:

Ho: *Organisational effectiveness is not related to e-commerce implementation success.*

H6: *Organisational effectiveness is related to e-commerce implementation success.*

The eight Internet-based e-commerce implementation activity variables for testing this hypothesis are:

X42: Organisational acceptance of e-commerce concept;
X43: Attain organisational objectives and strategy for e-commerce system implementation.
X44: Provide clearly defined on-line business plan;
X45: Improve organisational effectiveness and performance;
X46: Increase the quality of decision making;
X47: Improve general organisational effectiveness;
X48: Presence of a dedicated organisational structure; and
X49: Adequate organisational commitment and effectiveness.

Table 6.33 presents the results for organisational effectiveness. The canonical correlations are high, .963 and .752, and indicate that linear composites (e-commerce implementation success and the eight Internet-based e-commerce implementation activities) are high. The significance level for the F-statistic is less than .000. The cumulative redundancy index is .849, and indicates that 84.9 percent of the variance in SFAC1 and SFAC2 has been explained by the canonical variate for the eight Internet-based e-commerce implementation activity variables. The canonical loadings are high in each canonical function. These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. *The results indicated that organisational effectiveness is related to e-commerce implementation success.*

Table 6.33: The Canonical Correlation for Organisational Effectiveness

Criterion (E-Commerce Implementation Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.963	.000	.706
SFAC2	.752	.000	.143
			Total: .849

Predictor (E-Commerce Implementation Activities)		Canonical Loading 1	Canonical Loading 2
X42:	Organisational acceptance of e-commerce concept	.612	.153
X43:	Attain organisational objectives and strategy for e-commerce system implementation	.647	-.281
X44:	Provide clearly defined on-line business plan	.712	-.106
X45:	Improve organisational effectiveness and performance	.786	-.272
X46:	Increase the quality of decision making	.699	.314
X47:	Improve general organisational effectiveness	.813	.254
X48:	Presence of a dedicated organisational structure	.589	-.387
X49:	Adequate organisational commitment and effectiveness	.812	-.376

6.5.1.7. Hypotheses Testing Seven:

The 7th hypothesis suggests that Internet-based e-commerce implementation success is related to change management. Following the introduction of e-commerce the changes could occur in technology, structure, and culture of the organisation. Technological changes that are likely occurred in the organisation while implementing of e-commerce, the management needs to work for resources of the organisation. In the structural changes management may need to improve the process. In the cultural changes management could consider the employees of the organisation. Human behaviour found it difficult to adjust to change. An organisational culture that takes advantage of the trust and respect of the users for integrity and professionalism is likely to implement and benefit from a system like e-commerce. Therefore, change management is related to successful implementation of Internet-based e-commerce system. Based on these points, the hypothesis statements are:

Ho: *Change management is not related to Internet-based e-commerce implementation success.*

H7: *Change management is related to Internet-based e-commerce implementation success.*

The nine e-commerce implementation activity variables for testing this hypothesis are:

X50: Recognise needs for managing change;
X51: Sufficient anticipation and planning for organisational resistance to change;
X52: Gain cross-functional cooperation for organisational change;
X53: Provide necessary changes in the human resource policies for implementation,
X54: Communicate reasons for change to members of the organisation;
X55: Provide appropriate employee compensation incentives and training in the new process,
X56: Set reasonable expectations attributed to implementation as a solution for all organisational problems;
X57: Organisation's ability to cultural and structural transformation for the new system; and
X58: Facilitate the management of change.

Table 6.34 presents the results for change management. The canonical correlations are high, .924 and .716, and indicate that linear composites (e-commerce implementation success and the nine Internet-based e-commerce implementation activities) are high. The significance level for the F-statistic is less than .000. The cumulative redundancy index is .831, and indicates that 83.1 percent of the variance in SFAC1 and SFAC2 has been explained by the canonical variate for the nine Internet-based e-commerce implementation activity variables. The canonical loadings are high in each canonical function. These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. *The results indicated that change management is related to Internet-based e-commerce implementation success.*

Table 6.34: The Canonical Correlation for Change Management

Criterion (E-Commerce Implementation Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.924	.000	.716
SFAC2	.716	.000	.115
			Total: .831
Predictor (E-Commerce Implementation Activities)			Canonical Loading 1 2
X50: Recognise needs for managing change			.665 .238
X51: Sufficient anticipation and planning for organisational resistance to Change			.547 -.381
X52: Gain cross-functional cooperation for organisational change			.726 .106
X53: Provide necessary changes in the human resource policies for Implementation			.741 -.272
X54: Communicate reasons for change to members of the organisation			.848 -.113
X55: Provide appropriate employee compensation incentives and training in the new process			.813 - 248
X56: Set reasonable expectations attributed to implementation as a solution for all organisational problems			.791 - 273
X57: Organisation's ability to cultural and structural transformation for the new system			.826 .268
X58: Facilitate the management of change			.799 -.156

6.5.1.8 Hypotheses Testing Eight:

The 8th group of hypotheses deals with the relationship between the security and reliability of e-commerce system and Internet-based e-commerce implementation success. It has two subset hypotheses. The first subset hypothesis examines system security and the second examines system reliability. The first subsets of hypothesis statement are:

Ho: *E-commerce system security is not related to Internet-based e-commerce implementation success.*

H8a: *E-commerce system security is related to Internet-based e-commerce implementation success.*

The five e-commerce implementation activity variables for testing this hypothesis are:

X59: Determine, implement and control overall Internet/e-commerce system security needs;
X60: Provide clearly stated Internet security policy, standards and adequate user training on the security issues;
X61: Provide secure electronic payments infrastructure and convenient delivery mechanism;
X62: Provide and ensure adequate user privacy and confidentiality; and
X63: Provide overall e-commerce system network and data transaction security; data and database integrity.

These five variables are the predictor variables for the canonical correlation analysis. The canonical correlation analysis was performed on the two criterion variables, SFAC1 and SFAC2, and five predictor variables X59, X60, X61, X62 and X63. Table 6.35 shows the results of the canonical correlation analysis for system security. The canonical correlations are high, .983 and .765, and indicate that the bivariate correlation between the two linear composites (e-commerce implementation success and the five e-commerce implementation activities) is high. The significance level for the F-statistic is less than .000. The cumulative redundancy index is .876, and indicates that 87.6 percent of the variance in SFAC1 and SFAC2 has been explained by the canonical variate for the five Internet-based e-commerce implementation activity variables. The canonical loadings are high in each canonical function.

These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. *Thus, e-commerce system security is related to Internet-based e-commerce implementation success.*

Table 6.35: The Canonical Correlation for E-Commerce System Security

Criterion (E-Commerce Implementation Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.983	.000	.614
SFAC2	.765	.000	.242
			Total: .876
Predictor (E-Commerce Implementation Activities)			Canonical Loading 1 2
X59: Determine, implement and control overall Internet/e-commerce system security needs			.843 .391
X60: Provide clearly stated Internet security policy, standards and adequate user training on the security issues			.813 - 202
X61: Provide secure electronic payments infrastructure and convenient delivery mechanism			796 .254
X62: Provide and ensure adequate user privacy and confidentiality			.863 .571
X63: Provide overall e-commerce system network and data transaction security; data and database integrity			.856 .465

The second subset hypothesis tested that e-commerce system reliability is related to Internet-based e-commerce implementation success. The hypothesis statements for this subset are:

Ho: *E-commerce system reliability is not related to Internet-based e-commerce implementation success.*

H8b: *E-commerce system reliability is related to Internet-based e-commerce implementation success.*

There are three variables of Internet-based e-commerce implementation activities for this hypothesis testing. These are:

X64: Provide and ensure overall e-commerce system reliability;
X65: Provide a reliable Internet Service Provider (ISP) and Web server to access quickly and securely; and
X66: Provide quick system access availability and reliable information on time

These three variables are the predictor variables for the canonical correlation analysis. The canonical correlation analysis was performed on the two criterion variables, SFAC1 and SFAC2, and these three Internet-based e-commerce implementation activity variables, X64, X65 and X66.

Table 6.36 shows the results of the canonical correlation analysis for e-commerce system reliability. The canonical correlations are high, .962 and .749, and indicate that the bivariate correlation between the two linear composites (e-commerce implementation success and the three Internet-based e-commerce implementation activities) is high. The significance level for the F-statistic is less than .000. The cumulative redundancy index is .864, and indicates that 86.4 percent of the variance in SFAC1 and SFAC2 has been explained by the canonical variate for the three Internet-based e-commerce implementation activity variables. The canonical loadings are high in each canonical function. These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. *Thus, e-commerce system reliability is related to Internet-based e-commerce implementation success.*

Table 6.36: The Canonical Correlation for E-Commerce System Reliability

Criterion (E-Commerce Implementation Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.962	.000	.646
SFAC2	.749	.000	.218
			Total: .864
Predictor (E-Commerce Implementation Activities)			Canonical Loading 1 2
X64: Provide and ensure overall e-commerce system reliability			.865 .338
X65: Provide a reliable Internet Service Provider (ISP) and Web server to access quickly and securely.			.756 .414
X66: Provide quick system access availability and reliable information on time			.832 .287

Next, the variables from these two subsets plus one other variable, X67 (a total of nine variables) and the two criterion variables were analysed by the canonical correlation analysis for the 8th general hypothesis. This hypothesis tested that e-

commerce system security and reliability is positively related to Internet-based e-commerce implementation success. The hypothesis statements are:

Ho: *E-commerce system security and reliability is not related to Internet-based e-commerce implementation success.*

H8: *E-commerce system security and reliability is related to Internet-based e-commerce implementation success.*

The nine E-commerce implementation activity variables for testing this hypothesis are:

X59: Determine, implement and control overall Internet/e-commerce system security needs.
X60: Provide clearly stated Internet security policy, standards and adequate user training on the security issues;
X61: Provide secure electronic payments infrastructure and convenient delivery mechanism;
X62: Provide and ensure adequate user privacy and confidentiality;
X63: Provide overall e-commerce system network and data transaction security, data and database integrity;
X64: Provide and ensure overall e-commerce system reliability,
X65: Provide a reliable Internet Service Provider (ISP) and Web server to access quickly and securely;
X66: Provide quick system access availability and reliable information on time; and
X67: Provide secure and reliable Internet/e-commerce system.

Table 6.37 shows the nine predictor variables and the results of the canonical correlation analysis for e-commerce system security and reliability. The canonical correlations are high, .979 and .768, and indicate that the bivariate correlation between the two linear composites (e-commerce implementation success and the nine Internet-based e-commerce implementation activities) is high. The significance level for the F-statistic is less than .000. The cumulative redundancy index is .882, and indicates that 88.2 percent of the variance in SFAC1 and SFAC2 has been explained by the canonical variate for the nine Internet-based e-commerce implementation activity variables. The canonical loadings are high in each canonical function. These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. *Thus, e-commerce system security and reliability is related to Internet-based e-commerce implementation success.*

Table 6.37: The Canonical Correlation for E-Commerce System Security and Reliability

Criterion (E-Commerce Implementation Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.979	.000	.639
SFAC2	.768	.000	.243
			Total: .882

Predictor (E-Commerce Implementation Activities)		Canonical Loading 1	2
X59:	Determine, implement and control overall Internet/e-commerce system security needs	.715	.223
X60:	Provide clearly stated Internet security policy, standards and adequate user training on the security issues	.783	-.183
X61:	Provide secure electronic payments infrastructure and convenient delivery mechanism	.718	.216
X62:	Provide and ensure adequate user privacy and confidentiality	.876	.438
X63:	Provide overall e-commerce system network and data transaction security; data and database integrity	.749	.413
X64:	Provide and ensure overall e-commerce system reliability	.813	.365
X65:	Provide a reliable Internet Service Provider (ISP) and Web server to access quickly and securely.	.782	.451
X66:	Provide quick system access availability and reliable information on time	.726	.256
X67:	Provide secure and reliable Internet/e-commerce system	.889	.365

6.5.1.9 Hypotheses Testing Nine:

The 9th hypothesis suggests that Internet-based e-commerce implementation success is related to organisation's technological competence. Technological readiness and access to technological competence is important for successful implementation of an e-commerce system. The technological competence is related to the existence and use of the organisations' information technology infrastructure, in terms of hardware, software, and human resources components, which supported or enabled the implementation of Internet-based e-commerce system.

Therefore, technological competence is related to successful implementation of an Internet-based e-commerce system. Based on these points, the hypothesis statements are:

Ho: *Technological competence is not related to Internet-based e-commerce implementation success.*

H9: *Technological competence is related to Internet-based e-commerce implementation success.*

The seven e-commerce implementation activity variables for testing this hypothesis are:

X68: Adequate e-commerce application infrastructure (eg. reliable telecommunications network).
X69: Sufficient understanding about existing data, applications and e-commerce across the organisation;
X70: Satisfactory to continually assess emerging Internet/e-commerce capabilities.
X71: Level of Internet/e-commerce system knowledge, experience and expertise,
X72: Adequacy of e-commerce-related knowledge and skills of users and managers throughout the organisation;
X73: Level of technological readiness and access to technical competence (eg hardware, software, and human resources components, etc); and
X74: Ability of the organisation to identify, activate and coordinate its technological and human resources.

Table 6.38 presents the results for technological competence. The canonical correlations are high, .952 and .719, and indicate that linear composites (e-commerce implementation success and the seven Internet-based e-commerce implementation activities) are high. The significance level for the F-statistic is less than .000. The cumulative redundancy index is .826, and indicates that 82.6 percent of the variance in SFAC1 and SFAC2 has been explained by the canonical variate for the seven Internet-based e-commerce implementation activity variables. The canonical loadings are high in each canonical function.

These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. Thus, *the results indicated that technological competence is related to Internet-based e-commerce implementation success.*

Table 6.38: The Canonical Correlation for Technological Competence

Criterion (E-Commerce Implementation Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.952	.000	.615
SFAC2	.719	.000	.211
			Total: .826
Predictor (E-Commerce Implementation Activities)			Canonical Loading 1 2
X68: Adequate E-Commerce application infrastructure (eg. reliable Telecommunications network)			.745 .181
X69: Sufficient understanding about existing data, applications and e-commerce across the organisation			.713 .205
X70: Satisfactory to continually assess emerging Internet/e-commerce capabilities			.765 .254
X71: Level of Internet/e-commerce system knowledge, experience and expertise			.812 .171
X72: Adequacy of e-commerce-related knowledge and skills of users and managers throughout the organisation			.713 -.143
X73: Level of technological readiness and access to technical competence (eg. hardware, software, and human resources components, etc)			.613 -.248
X74: Ability of the organisation to identify, activate and coordinate its technological and human resources			.803 .254

6.5.1.10 Hypotheses Testing Ten:

The 10th group of hypotheses is related to the effectiveness of appropriate e-commerce system applications for Internet-based e-commerce implementation success. Internet and Web-based applications should meet online business operations requirements, be user-friendly, flexible and updated frequently. Appropriate software applications should meet criteria of quality, efficiency and adequacy. Thus, there are three hypotheses subsets plus one general hypothesis for this hypothesis testing.

The first subset of hypothesis tested that the quality of e-commerce system applications is related to Internet-based e-commerce implementation success. The hypotheses are:

Ho: *The quality of applications is not related to Internet-based e-commerce implementation success.*

H10a: *The quality of applications is related to Internet-based e-commerce implementation success.*

There are four predictor variables in this hypothesis:

X75: Provide high quality real-time Web-based e-commerce information and data output;
X76: Provide high quality e-commerce databases and Web applications;
X77: Select and install quality hardware and the right e-commerce software solution for the intended business operations; and
X78: Promote high quality applications for the implemented e-commerce.

Table 6.39 presents the results for the quality of applications. The canonical correlations are high, .959 and .751, and indicate that the bivariate correlation between the two linear composites (e-commerce implementation success and the four Internet-based e-commerce implementation activities) is high. The significance level for the F-statistic is less than .000. The cumulative redundancy index is .856, and indicates that 85.6 percent of the variance in SFAC1 and SFAC2 has been explained by the canonical variate for the four Internet-based e-commerce implementation activity variables. The canonical loadings are high in each canonical function.

These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. *Therefore, the quality of applications is related to Internet-based e-commerce implementation success.*

Table 6.39: The Canonical Correlation for the Quality of the Applications

Criterion (E-Commerce Implementation Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.959	.000	.721
SFAC2	.751	.000	.135
			Total: .856
Predictor (E-Commerce Implementation Activities)			Canonical Loading 1 2
X75: Provide high quality real-time Web-based e-commerce information and data output			.816 .126
X76: Provide high quality e-commerce databases and Web applications			.855 .421
X77: Select and install quality hardware and the right e-commerce software solution for the intended business operations			.843 .365
X78: Promote high quality applications for the implemented e-commerce			.899 -.189

The second hypothesis subset tested that the efficiency of applications is related to Internet-based e-commerce implementation success. An efficient application should be able to reduce the operations and maintenance cycle and improve the efficiency of applications for e-commerce system users. The hypothesis statements for this subset are:

Ho: *The efficiency of applications is not related to Internet-based e-commerce implementation success.*

H10b: *The efficiency of applications is related to Internet-based e-commerce implementation success.*

There are four predictor variables for this hypothesis:

X79: Provide up-to-date information content on Web site as part of e-commerce value-added services;
X80: Reduce the business processing; data and maintenance cycle.
X81: Provide efficient data transaction; convenient and widely accepted e-commerce payment system; and
X82: Improve the efficiency of e-commerce system applications for users.

The canonical correlation analysis results are shown in Table 6.40. The canonical correlations are high, .963 and .746, and indicate that the bivariate correlation between the two linear composites (e-commerce implementation success and the four Internet-based e-commerce implementation activities) is high. The significance level for the F-statistic is less than .000. The cumulative redundancy index is. 831, and indicates that 83.1 percent of the variance in SFAC1 and SFAC2 has been explained by the canonical variate for the four e-commerce implementation activity variables. The canonical loadings are high in each canonical function. These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. *Therefore, the efficiency of applications is related to Internet-based e-commerce implementation success.*

Table 6.40: The Canonical Results for the Efficiency of Applications

Criterion (E-Commerce Implementation Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.963	.000	.692
SFAC2	.746	.000	.139
			Total: .831

Predictor (E-Commerce Implementation Activities)	Canonical Loading 1	2
X79: Provide up-to-date information content on Web site as part of e-commerce value-added services	.824	.446
X80: Reduce the business processing; data and maintenance cycle	748	.632
X81: Provide efficient data transaction; convenient and widely accepted e-commerce payment system	.765	.387
X82: Improve the efficiency of e-commerce system applications for users	.803	-.125

The third hypothesis subset tested that the flexibility and adequacy of applications is related to e-commerce implementation success. This hypothesis is that e-commerce and Web-based software applications should be appropriate for Internet-based e-commerce system implementation. A flexible and adequate application would make the e-commerce system implementation easier. A flexible and adequate application should also provide competitive advantage for the e-commerce implementation. The hypotheses are:

Ho: *The flexibility and adequacy of applications is not related to Internet-based e-commerce implementation success.*

H10c: *The flexibility and adequacy of applications is related to Internet-based e-commerce implementation success.*

There are six predictor variables in this hypothesis:

X83: Provide flexible and user friendly (ease-of-use) e-commerce system applications.
X84: Provide availability and easy access to e-commerce system for 24 hours a day 7 days a week;
X85: Promote applications that make e-commerce system business process easier;
X86: Promote e-commerce system applications that provide competitive edge for the firm.
X87: Provide flexible and convenient data transaction and payment methods; and
X88: Provide and promote flexible, adequate, and appropriate applications for e-commerce system implementation.

Table 6.41 provides the results for the applications' flexibility and adequacy. The canonical correlations are high, .973 and .729, and indicate that the bivariate correlation between the two linear composites (e-commerce implementation success and the six e-commerce implementation activities) is high. The significance level for the F-statistic is less than .000. The cumulative redundancy index is .841, and indicates that 84.1 percent of the variance in SFAC1 and SFAC2 has been explained by the canonical variate for the six e-commerce implementation activity variables. The canonical loadings are high in each canonical function.

These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. *Therefore, the flexibility and adequacy of applications is related to Internet-based e-commerce implementation success.*

Table 6.41: The Canonical Correlation for the Flexibility and Adequacy of Applications

Criterion (E-Commerce Implementation Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.973	.000	.708
SFAC2	.729	.000	.133
			Total: .841
Predictor (E-Commerce Implementation Activities)			Canonical Loading 1 2
X83: Provide flexible and user friendly (ease-of-use) e-commerce system applications			.791 .359
X84: Provide availability and easy access to e-commerce system for 24 hours a day 7 days a week			.714 .223
X85: Promote applications that make e-commerce system business process easier			.502 .674
X86: Promote e-commerce system applications that provide competitive edge for the firm			.713 .598
X87: Provide flexible and convenient data transaction and payment methods			.698 .387
X88: Provide and promote flexible, adequate, and appropriate applications for e-commerce system implementation			.876 -.143

The general hypothesis thus tested that an appropriate e-commerce system application should have quality, efficiency, flexibility and adequacy as tested from the three subsets. The hypotheses are:

Ho: *Appropriate e-commerce system software application is not related to Internet-based e-commerce implementation success.*

H10: *Appropriate e-commerce system software application is related to Internet-based e-commerce implementation success.*

There are fourteen predictor variables in this general hypothesis:

X75: Provide high quality real-time Web-based e-commerce information and data output.
X76: Provide high quality e-commerce databases and Web applications;
X77: Select and install quality hardware and the right e-commerce software solution for the intended business operations;
X78: Promote high quality applications for the implemented e-commerce;

X79: Provide up-to-date information content on Web site as part of e-commerce value-added services;
X80: Reduce the business processing; data and maintenance cycle;
X81: Provide efficient data transaction; convenient and widely accepted e-commerce payment system;
X82: Improve the efficiency of e-commerce system applications for users;
X83: Provide flexible and user friendly (ease-of-use) e-commerce system applications;
X84: Provide availability and easy access to e-commerce system for 24 hours a day 7 days a week.
X85: Promote applications that make e-commerce system business process easier;
X86: Promote e-commerce system applications that provide competitive edge for the firm;
X87: Provide flexible and convenient data transaction and payment methods; and
X88: Provide and promote flexible, adequate, and appropriate applications for e-commerce system implementation.

Table 6.42 provides the results for the appropriate applications. The correlations are .979 and .712, and indicate that the bivariate correlation between the two linear composites is high. The significance level for the F-statistic is less than .000. The cumulative redundancy index is .833, and indicates that 83.3 percent of the variance in SFAC1 and SFAC2 has been explained by the canonical variate for the fourteen e-commerce implementation activity variables. The canonical loadings are high in each canonical function.

These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. *Therefore, appropriate e-commerce system software application is related to Internet-based e-commerce implementation success.*

Table 6.42: The Canonical Correlation for the Appropriate Applications

Criterion (E-Commerce Implementation Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.979	.000	.688
SFAC2	.712	.000	.145
			Total: .833

Predictor (E-Commerce Implementation Activities)		Canonical Loading 1	2
X75:	Provide high quality real-time Web-based e-commerce information and data output	.672	.276
X76:	Provide high quality e-commerce databases and Web applications	.618	.354
X77:	Select and install quality hardware and the right e-commerce software solution for the intended business operations	.698	.246
X78:	Promote high quality applications for the implemented e-Commerce	.743	.318
X79:	Provide up-to-date information content on Web site as part of e-commerce value-added services	.712	.216
X80:	Reduce the business processing; data and maintenance cycle	.779	.137
X81:	Provide efficient data transaction; convenient and widely accepted e-commerce payment system	.665	.329
X82:	Improve the efficiency of e-commerce system applications for Users	.865	.243
X83:	Provide flexible and user friendly (ease-of-use) e-commerce system applications	.778	.141
X84:	Provide availability and easy access to e-commerce system for 24 hours a day 7 days a week	.667	.436
X85:	Promote applications that make e-commerce system business process easier	.325	.687
X86:	Promote e-commerce system applications that provide competitive edge for the firm	.389	.713
X87:	Provide flexible and convenient data transaction and payment Methods	.657	.376
X88:	Provide and promote flexible, adequate, and appropriate applications for e-commerce system implementation	.717	-.126

6.5.2 Hypotheses Testing by Factors

The canonical correlation analysis was used to examine the relationship between the ten factors that were extracted from 88 Internet-based e-commerce implementation activity variables, and the two factors that were extracted from the 12 Internet-based e-commerce implementation success variables. The results from the canonical correlation analysis served two purposes in this study. One purpose was to retest the

proposed hypotheses, and the other one was to show that these ten factors are critical success factors (CSFs) for Internet-based e-commerce implementation success.

When performing the canonical correlation analysis for the 10 e-commerce CSFs, there are two criterion variables in each of the canonical functions. The two criterion variables, SFAC1 and SFAC2, are the two factors extracted from the twelve Internet-based e-commerce implementation success variables (from Y1 to Y12) by factor analysis. SFAC1 is labelled "User-Oriented Improvements" and SFAC2 is labelled "E-Commerce System Effectiveness". For each canonical correlation analysis, the predictor variables are the variables that have been extracted into that particular critical success factor. The testing of the hypotheses for the 10 CSF is presented in the following section.

6.5.2.1 Critical Success Factor (CSF)-1: Management Commitment and Support for Internet-based E-Commerce Implementation

The first factor extracted from the 88-implementation activities is labelled "Management Commitment and Support for Internet-based E-Commerce Implementation". This factor is composed of eleven e-commerce implementation activity variables. Those eleven variables were used as the predictor variables for the canonical correlation analysis. The hypothesis statements for this CSF are:

Ho: *Commitment and support from top management and users are not related to Internet-based e-commerce implementation success.*

Ha: *Commitment and support from top management and users are related to Internet-based e-commerce implementation success.*

The eleven-predictor variables in this general hypothesis are:

X1: Top management's sufficient understanding about the goals of e-commerce system implementation;
X2: Promote acceptance of the e-commerce implementation concept to the whole firm,
X3: Promote support of top management for the e-commerce implementation concept,

X4: Design a strategic e-commerce system implementation planning;
X6: Top management involvement in the e-commerce implementation efforts and processes;
X7: Successful management leadership for implementation efforts;
X8: Commitment and support of management to the e-commerce implementation concept;
X29: Provide competent e-commerce staff;
X43: Attain organisational objectives and strategy for e-commerce system implementation;
X53: Provide necessary changes in the human resource policies for implementation; and
X58: Facilitate the management of change.

Table 6.43 presents the factor loading for each variable of e-commerce implementation activities and the results of the canonical correlation analysis. The canonical correlations are high, .983 and .765, and indicate that the relationship between SFAC1 and the eleven e-commerce implementation activities contributes 98.3 percent to the two linear composites; and the relationship between SFAC2 and the eleven e-commerce implementation activities contributes 76.5 percent to the two linear composites. The cumulative redundancy index is .882, and indicates that 88.2 percent of the variance in the criterion variables (SFAC1 and SFAC2) can be explained by the linear composite of the eleven predictor variables (e-commerce implementation activities). The significance level of the F-statistic is less than .000. The canonical loadings are high in the canonical function.

These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported.

This finding indicates that top management commitment and support for e-commerce implementation is highly related to Internet-based e-commerce system implementation success. This factor is one of the CSFs for e-commerce implementation. *This finding also supports the proposed hypothesis that commitment and support from top management and users is related to e-commerce implementation success (H1).*

Table 6.43: The Canonical Correlation for CSF-1: Management Commitment and Support for E-Commerce Implementation

Criterion (Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.983	.000	.724
SFAC2	.765	.000	.158
			Total: .882

Predictor (E-Commerce Implementation Activities)		Factor Loading	Canonical Loading 1	Canonical Loading 2
X1:	Top management's sufficient understanding about the goals of e-commerce system implementation	.843	.824	.412
X2:	Promote acceptance of the e-commerce implementation concept to the whole firm	.782	.699	.162
X3:	Promote support of top management for the e-commerce implementation concept	.733	.749	.431
X4:	Design a strategic e-commerce system implementation planning	.724	.613	.524
X6:	Top management involvement in the e-commerce implementation efforts and processes	.793	.734	.413
X7:	Successful management leadership for implementation Efforts	.675	.643	.418
X8:	Commitment and support of management to the e-Commerce implementation concept	.648	.675	.298
X29:	Provide competent e-commerce staff	.634	.656	-.163
X43:	Attain organisational objectives and strategy for e-Commerce system implementation	.612	.681	.365
X53:	Provide necessary changes in the human resource policies for implementation	.598	.609	.249
X58:	Facilitate the management of change	.571	.638	-.287

6.5.2.2 Critical Success Factor (CSF)-2: Organisational and Management Objectives for E-Commerce Implementation.

From the factor analysis, the second extracted CSF from the 88 Internet-based e-commerce implementation activities is labelled "Organisational and Management Objectives for E-Commerce Implementation". This factor is composed of eleven e-commerce variables as the predictor variables for the canonical correlation analysis. The hypothesis statements for this CSF are:

Ho: *Organisational and management objectives for e-commerce implementation are not related to Internet-based e-commerce system implementation success.*

Ha: *Organisational and management objectives for e-commerce implementation are related to Internet-based e-commerce system implementation success.*

The eleven-predictor variables in this general hypothesis are:

X11: Provide coordination through communication of corporate or business departments.
X42: Organisational acceptance of e-commerce concept;
X44: Provide clearly defined on-line business plan;
X45: Improve organisational effectiveness and performance;
X46: Increase the quality of decision making;
X47: Improve general organisational effectiveness;
X49: Adequate organisational commitment and effectiveness;
X76: Provide high quality e-commerce databases and Web applications.
X80: Reduce the business processing; data and maintenance cycle;
X82: Improve the efficiency of e-commerce system applications for users; and
X85: Promote applications that make e-commerce system business process easier.

Table 6.44 presents the factor loading for each variable of Internet-based e-commerce implementation activities and the results of the canonical correlation analysis. The canonical correlations are high, .969 and .738, and indicate that the relationship between SFAC1 and the eleven e-commerce implementation activities contributes 96.9 percent to the two linear composites, and the relationship between SFAC2 and the eleven e-commerce implementation activities contributes 73.8 percent to the two linear composites. The cumulative redundancy index is .852, and indicates that 85.2 percent of the variance in the criterion variables (SFAC1 and SFAC2) can be explained by the linear composite of the eleven predictor variables (e-commerce implementation activities). The significance level of the F-statistic is less than .000 and the canonical loadings are high. These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. Thus, organisational and management objectives for e-commerce implementation are highly related to Internet-based e-commerce implementation success; and this factor is one of the CSFs for Internet-based e-commerce implementation success. *This finding also supports the proposed hypothesis that organisational effectiveness is related to Internet-based e-commerce implementation success (H6).*

Table 6.44: The Canonical Correlation for CSF-2: Organisational and Management Objectives for E-Commerce Implementation

Criterion (Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.969	.000	.727
SFAC2	.738	.000	.125
			Total: .852

Predictor (E-Commerce Implementation Activities)		Factor Loading	Canonical Loading 1	2
X11:	Provide coordination through communication of corporate or business departments	.821	.803	.234
X42:	Organisational acceptance of e-commerce concept	.769	.723	.328
X44:	Provide clearly defined on-line business plan	.732	.784	.187
X45:	Improve organisational effectiveness and performance	.707	.752	.276
X46:	Increase the quality of decision making	.684	.713	.318
X47:	Improve general organisational effectiveness	.663	.658	.287
X49:	Adequate organisational commitment and effectiveness	.654	.681	.378
X76:	Provide high quality e-commerce databases and Web Applications	.622	.713	.146
X80:	Reduce the business processing; data and maintenance cycle	.607	.688	.213
X82:	Improve the efficiency of e-commerce system applications for users	.583	.714	-.153
X85:	Promote applications that make e-commerce system business process easier	.562	.602	.318

6.5.2.3 Critical Success Factor (CSF)-3: Communication between Users and the E-Commerce Department

From factor analysis, the third extracted critical success factor (CSF) from the 88 e-commerce implementation activities is labelled "Communication between Users and the E-Commerce Department". This factor is composed of ten Internet-based e-commerce implementation activity variables. This study took those ten variables as the predictor variables for the canonical correlation analysis. The hypothesis statements for this CSF are:

Ho: *Communication between users and the e-commerce department is not related to Internet-based e-commerce implementation success.*

Ha: *Communication between users and the e-commerce department is related to Internet-based e-commerce implementation success.*

The ten-predictor variables in this general hypothesis are:

X9: Communicate with users about e-commerce procedures and services,
X10: Provide effective communication among the organisational units,
X12: Communicate with e-commerce users;
X13: Provide training to e-commerce staff and users;
X14: Respond to user's request for e-commerce system support;
X16: Providing reliable and consistent communication and facilitations to all relevant units;
X26: Provide users' understanding of the implemented e-commerce system;
X31: Manage e-commerce resources effectively and efficiently;
X75: Provide high quality real-time Web-based e-commerce information and data output, and
X78: Promote high quality applications for the implemented e-commerce.

Table 6.45 presents the factor loading for each variable of e-commerce implementation activities and the results of the canonical correlation analysis. The canonical correlations are high, .963 and .757, and indicate that the relationship between SFAC1 and the ten e-commerce implementation activities contributes 96.3 percent to the two linear composites; and the relationship between SFAC2 and the ten E-commerce implementation activities contributes 75.7 percent to the two linear composites. The cumulative redundancy index is .843, and indicates that 84.3 percent of the variance in the criterion variables (SFAC1 and SFAC2) can be explained by the linear composite of the ten predictor variables (e-commerce implementation activities). The significance level of the F-statistic is less than .000. The canonical loadings are high in the canonical function. These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported.

Thus, communication between users and e-commerce department is highly related to Internet-based e-commerce implementation success; and this factor is one of the CSFs for e-commerce implementation success. *This finding also supports the proposed hypothesis that communication between users and the e-commerce department is related to e-commerce implementation success (H2).*

Table 6.45: The Canonical Correlation for CSF-3: Communication between Users and the E-Commerce Department

Criterion (Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.963	.000	.731
SFAC2	.757	.000	.112
			Total: .843

Predictor (E-Commerce Implementation Activities)		Factor Loading	Canonical Loading 1	Canonical Loading 2
X9:	Communicate with users about e-commerce procedures and services	.793	.716	.324
X10:	Provide effective communication among the organisational units	.772	.731	.198
X12:	Communicate with e-commerce users	.735	702	.325
X13:	Provide training to e-commerce staff and users	.693	.743	.246
X14:	Respond to user's request for e-commerce system support	.684	.645	-.154
X16:	Providing reliable and consistent communication and facilitations to all relevant units	.664	732	.286
X26:	Provide users' understanding of the implemented e-commerce system	654	.665	.193
X31:	Manage e-commerce resources effectively and efficiently	.642	.703	.271
X75:	Provide high quality real-time Web-based e-commerce information and data output	.610	.849	-.265
X78:	Promote high quality applications for the implemented e-commerce	.574	.812	- 163

6.5.2.4 Critical Success Factor (CSF)-4: E-Commerce System Security and Reliability

The fourth factor extracted from the 88 e-commerce implementation activities is labelled "E-Commerce System Security and Reliability". This factor is composed of five e-commerce implementation activity variables. Those five variables were used as the predictor variables for the canonical correlation analysis. The hypothesis statements for this CSF are:

Ho: *E-commerce system security and reliability is not related to Internet-based e-commerce implementation success.*

Ha: *E-commerce system security and reliability is related to Internet-based e-commerce implementation success.*

The ten-predictor variables in this general hypothesis are:

X17: Improve users' confidence in the e-commerce system;
X59: Determine, implement and control overall Internet/e-commerce system security needs ;
X60: Provide clearly stated Internet security policy, standards and adequate user training on the security issues;
X61: Provide secure electronic payments infrastructure and convenient delivery mechanism;
X62: Provide and ensure adequate user privacy and confidentiality;
X63: Provide overall e-commerce system network and data transaction security; data and database integrity;
X64: Provide and ensure overall e-commerce system reliability;
X65: Provide a reliable Internet Service Provider (ISP) and Web server to access quickly and securely;
X66: Provide quick system access availability and reliable information on time; and
X67: Provide secure and reliable Internet/e-commerce system.

Table 6.46 presents the factor loading for each variable of e-commerce implementation activities and the results of the canonical correlation analysis. The canonical correlations are high, .975 and .834, and indicate that the relationship between SFAC1 and the ten e-commerce implementation activities contributes 97.5 percent to the two linear composites; and the relationship between SFAC2 and the ten e-commerce implementation activities contributes 83.4 percent to the two linear composites. The cumulative redundancy index indicates that 84.7 percent of the variance in the criterion variables (SFAC1 and SFAC2) can be explained by the linear composite of the ten predictor variables. The significance level of the F-statistic is less than .000. The canonical loadings are high in the canonical function. These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. Thus, the E-commerce system security and reliability is highly related to e-commerce implementation success; and this factor is one of the CSFs for e-commerce implementation success.

This finding also supports the proposed hypothesis that the e-commerce system security and reliability are related to Internet-based e-commerce implementation success (H8).

Table 6.46: The Canonical Correlation for CSF-4: E-Commerce System Security and Reliability

Criterion (Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.975	.000	.612
SFAC2	.834	.000	.235
			Total: .847

Predictor (E-Commerce Implementation Activities)		Factor Loading	Canonical Loading 1	2
X17:	Improve users' confidence in the e-commerce system	.782	.803	.146
X59:	Determine, implement and control overall Internet/e-commerce system security needs	.777	.754	.224
X60:	Provide clearly stated Internet security policy, standards and adequate user training on the security issues	.732	.713	-.126
X61:	Provide secure electronic payments infrastructure and convenient delivery mechanism	.688	.709	-.215
X62:	Provide and ensure adequate user privacy and confidentiality	.675	.832	.465
X63:	Provide overall e-commerce system network and data transaction security; data and database integrity	.653	.734	.327
X64:	Provide and ensure overall e-commerce system reliability	.633	.712	.238
X65:	Provide a reliable Internet Service Provider (ISP) and Web server to access quickly and securely.	.624	.730	-.165
X66:	Provide quick system access availability and reliable information on time	.601	.771	-.231
X67:	Provide secure and reliable Internet/e-commerce system	.581	.882	.218

6.5.2.5 Critical Success Factor (CSF)-5: E-Commerce Department's Service Function

The fifth factor extracted from the 88 e-commerce implementation activities is labelled "E-Commerce Department's Service Function". This factor is composed of nine Internet-based e-commerce implementation activity variables. Those nine variables were used as the predictor variables for the canonical correlation analysis. The hypothesis statements for this CSF are:

Ho: *E-commerce department's service function is not related to Internet-based e-commerce implementation success.*

Ha: *E-commerce department's service function is related to Internet-based e-commerce implementation success.*

The nine-predictor variables in this general hypothesis are:

X5: Promote users' commitment and support for the e-commerce system implementation concept;
X15 Provide information and data sharing among the organisational units;
X23: Satisfy user's expectations of the e-commerce system;
X30: Develop and provide a basis for control of e-commerce system guidelines, standards and policies, etc.;
X32: Provide reliable and qualified e-commerce services, enabling tools and education (training).
X33: Facilitate an increase in the productivity of users and their business processes;
X34: Provide adequate control for e-commerce system implementation and plan for maintenance and its costs;
X35: Providing the organisational units with information for 24 hours a day and seven days a week; and
X88: Provide and promote flexible, adequate, and appropriate applications for e-commerce system implementation.

Table 6.47 presents the factor loading for each variable of e-commerce implementation activities and the results of the canonical correlation analysis. The canonical correlations are high, .953 and .824, and indicate that the relationship between SFAC1 and the nine e-commerce implementation activities contributes 95.3 percent to the two linear composites; and the relationship between SFAC2 and the nine e-commerce implementation activities contributes 82.4 percent to the two linear composites. The cumulative redundancy index indicates that 83.2 percent of the variance in the criterion variables (SFAC1 and SFAC2) can be explained by the linear composite of the nine predictor variables. The significance level of the F-statistic is less than .000. The canonical loadings are high in the canonical function. These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. Thus, the e-commerce department's service function is highly related to Internet-based e-commerce implementation success; and this factor is one of the CSFs for Internet-based e-commerce implementation success.

This finding also supports the proposed hypothesis that the support services of an e-commerce department are related to Internet-based e-commerce implementation success (H4).

Table 6.47: The Canonical Correlation for CSF-5: E-Commerce Department's Service Function

Criterion (Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.953	.000	.613
SFAC2	.824	.000	.219
			Total: .832

Predictor (E-Commerce Implementation Activities)		Factor Loading	Canonical Loading 1	Canonical Loading 2
X5:	Promote users' commitment and support for the e-commerce system implementation concept	.798	.732	.326
X15	Provide information and data sharing among the organisational units	.774	.718	235
X23:	Satisfy user's expectations of the e-commerce system	.762	.750	.166
X30:	Develop and provide a basis for control of e-commerce system guidelines, standards and policies, etc.	.743	.715	.458
X32:	Provide reliable and qualified e-commerce services, enabling tools and education (training)	.714	.689	321
X33:	Facilitate an increase in the productivity of users and their business processes.	.673	652	.276
X34:	Provide adequate control for e-commerce system implementation and plan for maintenance and its costs	.643	.713	.324
X35:	Providing the organisational units with information for 24 hours a day and seven days a week	.575	.726	.283
X88:	Provide and promote flexible, adequate, and appropriate applications for e-commerce system implementation	.568	.768	-.264

6.5.2.6 Critical Success Factor (CSF)-6: Integrating E-Commerce into the Existing Business Functions

The sixth factor extracted from the 88 e-commerce implementation activities is labelled "Integrating E-Commerce into the Existing Business Functions". This factor is composed of eight Internet-based e-commerce implementation activity variables. Those eight variables were used as the predictor variables for the canonical correlation analysis. The hypothesis statements for this CSF are:

Ho: *Integrating e-commerce into the existing business functions is not related to Internet-based e-commerce implementation success.*

Ha: *Integrating e-commerce into the existing business functions is related to Internet-based e-commerce implementation success.*

The eight-predictor variables in this general hypothesis are:

X36: Provide e-commerce system integration with ongoing (existing) business processes.
X37: Provide seamless integration of all supply chain processes and measurements;
X38: Integrate e-commerce system with all internal operation functions (eg. order processing),
X39: Integrate e-commerce system with all external operation functions (eg. customers, suppliers);
X40: Enhance firm's value-chain integration with e-commerce system;
X41: Provide a high degree of e-commerce integration and consistency across the infrastructure, networks, databases and overall business processes;
X48: Presence of a dedicated organisational structure; and
X69: Sufficient understanding about existing data, applications and e-commerce across the organisation.

Table 6.48 presents the factor loading for each variable of e-commerce implementation activities and the results of the canonical correlation analysis. The canonical correlations are high, .947 and .816, and indicate that the relationship between SFAC1 and the eight e-commerce implementation activities contributes 94.7 percent to the two linear composites; and the relationship between SFAC2 and the eight e-commerce implementation activities contributes 81.6 percent to the two linear composites. The cumulative redundancy index indicates that 82.9 percent of the variance in the criterion variables (SFAC1 and SFAC2) can be explained by the linear composite of the eight predictor variables. The significance level of the F-statistic is less than .000. The canonical loadings are high in the canonical function. These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. Thus, integrating e-commerce system into the existing business functions is highly related to Internet-based e-commerce implementation success; and this factor is one of the CSFs for Internet-based e-commerce implementation success.

This finding also supports the proposed hypothesis that integrating e-commerce system into the existing business functions are related to Internet-based e-commerce implementation success (H5).

Table 6.48: The Canonical Correlation for CSF-6: Integrating E-Commerce into the Existing Business Functions

Criterion (Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.947	.000	.652
SFAC2	.816	.000	.174
			Total: .829

Predictor (E-Commerce Implementation Activities)		Factor Loading	Canonical Loading 1	Canonical Loading 2
X36:	Provide e-commerce system integration with ongoing (existing) business processes	.773	.716	.265
X37:	Provide seamless integration of all supply chain processes and measurements	.769	.819	.153
X38:	Integrate e-commerce system with all internal operation functions (eg. order processing)	.753	.714	.362
X39:	Integrate e-commerce system with all external operation functions (eg. customers, suppliers)	724	.821	.258
X40:	Enhance firm's value-chain integration with e-commerce system	.681	.703	.291
X41:	Provide a high degree of e-commerce integration and consistency across the infrastructure, networks, databases and overall business processes	.655	.762	-.263
X48:	Presence of a dedicated organisational structure	.631	.731	-.187
X69:	Sufficient understanding about existing data, applications and e-commerce across the organisation	.579	.713	.165

6.5.2.7 Critical Success Factor (CSF)-7: Change Management for E-Commerce System

The seventh factor extracted from the 88 e-commerce implementation activities is labelled "Change Management for E-Commerce System Implementation". This factor is composed of eight Internet-based e-commerce implementation activity variables. Those eight variables were used as the predictor variables for the canonical correlation analysis. The hypothesis statements for this CSF are:

Ho: *Change management is not related to Internet-based e-commerce implementation success.*

Ha: *Change management is related to Internet-based e-commerce implementation success.*

The eight-predictor variables in this general hypothesis are:

X50: Recognise needs for managing change;
X51: Sufficient anticipation and planning for organisational resistance to change;
X52: Gain cross-functional cooperation for organisational change;
X54: Communicate reasons for change to members of the organisation;
X55: Provide appropriate employee compensation incentives and training in the new process;
X56: Set reasonable expectations attributed to implementation as a solution for all organisational problems;
X57: Organisation's ability to cultural and structural transformation for the new system; and
X74: Ability of the organisation to identify, activate and coordinate its technological and human resources.

Table 6.49 presents the factor loading for each variable of e-commerce implementation activities and the results of the canonical correlation analysis. The canonical correlations are high, .953 and .834, and indicate that the relationship between SFAC1 and the eight e-commerce implementation activities contributes 95.3 percent to the two linear composites; and the relationship between SFAC2 and the eight e-commerce implementation activities contributes 83.4 percent to the two linear composites. The cumulative redundancy index indicates that 84.8 percent of the variance in the criterion variables (SFAC1 and SFAC2) can be explained by the linear composite of the eight predictor variables. The significance level of the F-statistic is less than .000. The canonical loadings are high in the canonical function. These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported.

Thus, change management is highly related to Internet-based e-commerce implementation success; and this factor is one of the CSFs for Internet-based e-commerce implementation success. *This finding also supports the proposed hypothesis that change management is related to Internet-based e-commerce implementation success (H7).*

Table 6.49: The Canonical Correlation for CSF-7: Change Management for E-Commerce System Implementation

Criterion (Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.953	.000	.635
SFAC2	.834	.000	.213
			Total: .848

Predictor (E-Commerce Implementation Activities)		Factor Loading	Canonical Loading 1	Canonical Loading 2
X50:	Recognise needs for managing change	.782	.721	.362
X51:	Sufficient anticipation and planning for organisational resistance to change	.745	.713	-.251
X52:	Gain cross-functional cooperation for organisational change	.735	.687	.423
X54:	Communicate reasons for change to members of the organisation	.711	.832	.183
X55:	Provide appropriate employee compensation incentives and training in the new process	.680	716	312
X56:	Set reasonable expectations attributed to implementation as a solution for all organisational problems	.663	.732	-.143
X57:	Organisation's ability to cultural and structural transformation for the new system	.625	.765	-.179
X74:	Ability of the organisation to identify, activate and coordinate its technological and human resources	.580	.802	.103

6.5.2.8 Critical Success Factor (CSF)-8: Appropriate E-Commerce System Applications

The eighth factor extracted from the 88 e-commerce implementation activities is labelled "Appropriate E-Commerce System Applications". This factor is composed of eight Internet-based e-commerce implementation activity variables. Those eight variables were used as the predictor variables for the canonical correlation analysis. The hypothesis statements for this CSF are:

Ho: *Appropriate e-commerce system applications are not related to Internet-based e-commerce implementation success.*

Ha: *Appropriate e-commerce system applications are related to Internet-based e-commerce implementation success.*

The eight-predictor variables in this general hypothesis are:

X24: Ease the use of E-commerce system tools for users
X77: Select and install quality hardware and the right E-commerce software solution for the intended business operations
X79: Provide up-to-date information content on Web site as part of E-commerce value-added services
X81: Provide efficient data transaction; convenient and widely accepted E-commerce payment system
X83: Provide flexible and user friendly (ease-of-use) E-commerce system applications
X84: Provide availability and easy access to E-commerce system for 24 hours a day 7 days a week
X86: Promote E-commerce system applications that provide competitive edge for the firm
X87: Provide flexible and convenient data transaction and payment methods

Table 6.50 presents the factor loading for each variable of e-commerce implementation activities and the results of the canonical correlation analysis. The canonical correlations are high, .971 and .625, and indicate that the relationship between SFAC1 and the eight e-commerce implementation activities contributes 97.1 percent to the two linear composites; and the relationship between SFAC2 and the eight e-commerce implementation activities contributes 62.5 percent to the two linear composites. The cumulative redundancy index indicates that 79.4 percent of the variance in the criterion variables (SFAC1 and SFAC2) can be explained by the linear composite of the eight predictor variables. The significance level of the F-statistic is less than .000. The canonical loadings are high in the canonical function. These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported.

Thus, appropriate e-commerce system applications are highly related to Internet-based e-commerce implementation success; and this factor is one of the CSFs for Internet-based e-commerce implementation success. *This finding supports the proposed hypothesis that appropriate e-commerce system application is related to e-commerce implementation success (H10).*

Table 6.50: The Canonical Correlation for CSF-8: Appropriate E-Commerce System Applications

Criterion (Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.971	.000	.681
SFAC2	.625	.000	.113
			Total: .794

Predictor (E-Commerce Implementation Activities)		Factor Loading	Canonical Loading 1	2
X24:	Ease the use of e-commerce system tools for users	.775	.756	-.174
X77:	Select and install quality hardware and the right e-commerce software solution for the intended business operations	.751	.765	.234
X79:	Provide up-to-date information content on Web site as part of e-commerce value-added services	.732	.786	.234
X81:	Provide efficient data transaction; convenient and widely accepted e-commerce payment system	.720	.699	128
X83:	Provide flexible and user friendly (ease-of-use) e-Commerce system applications	.682	.812	.403
X84:	Provide availability and easy access to e-commerce system for 24 hours a day 7 days a week	.671	.893	-.162
X86:	Promote e-commerce system applications that provide competitive edge for the firm	.629	.854	.271
X87:	Provide flexible and convenient data transaction and payment methods	.563	.738	.353

6.5.2.9 Critical Success Factor (CSF)-9: User Participation and Satisfaction

The ninth factor extracted from the 88 e-commerce implementation activities is labelled "User Participation and Satisfaction for E-Commerce Implementation". This factor is composed of eight Internet-based e-commerce implementation activity variables. Those eight variables were used as the predictor variables for the canonical correlation analysis. The hypothesis statements for this CSF are:

This study used those eight variables as the predictor variables for the canonical correlation analysis. The hypothesis statements for this CSF are:

Ho: *User participation and satisfaction is not related to Internet-based e-commerce implementation success.*

Ha: *User participation and satisfaction is related to Internet-based e-commerce implementation success.*

The eight-predictor variables in this general hypothesis are:

X18: Improve access (easier and quicker) to the e-commerce system;
X19: Improve user productivity by realisation of user requirements;
X20: Permit control over e-commerce services by users;
X21: Generate user satisfaction with the implemented e-commerce system;
X22: Increase the use of implemented e-commerce systems;
X25: Provide users' positives attitudes toward e-commerce system implementation;
X27: Provide users' participation in the e-commerce system implementation; and
X28: Involve users in e-commerce system implementation.

Table 6.51 presents the factor loading for each variable of e-commerce implementation activities and the results of the canonical correlation analysis. The canonical correlations are high, .987 and .753, and indicate that the relationship between SFAC1 and the eight e-commerce implementation activities contributes 98.7 percent to the two linear composites; and the relationship between SFAC2 and the eight E-commerce implementation activities contributes 75.3 percent to the two linear composites. The cumulative redundancy index is .829, and indicates that 82.9 percent of the variance in the criterion variables (SFAC1 and SFAC2) can be explained by the linear composite of the eight predictor variables (E-commerce implementation activities). The significance level of the F-statistic is less than .000, and canonical loadings are high in the canonical function. The results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported. Thus, user participation and satisfaction is highly related to e-commerce implementation success; and this factor is one of the critical success factors for Internet-based e-commerce implementation success.

This finding also supports the proposed hypothesis that user appreciation is related to Internet-based e-commerce implementation success (H3); because if system users participate (involve) in the process of e-commerce implementation then they will increase their understanding and skills of the e-commerce implementation. This will generate their satisfaction from the e-commerce system. Thus, users appreciate the Internet-based e-commerce system.

Table 6.51: The Canonical Correlation for CSF-9: User Participation and Satisfaction for E-Commerce System

Criterion (Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.987	.000	.673
SFAC2	.753	.000	.156
			Total: 829

Predictor (E-Commerce Implementation Activities)		Factor Loading	Canonical Loading 1	Canonical Loading 2
X18:	Improve access (easier and quicker) to the e-commerce system	.783	.869	.412
X19:	Improve user productivity by realisation of user requirements	.741	.804	.286
X20:	Permit control over e-commerce services by users	.733	.796	.421
X21:	Generate user satisfaction with the implemented e-commerce system	.712	.768	-.143
X22:	Increase the use of implemented e-commerce systems	.701	.732	-.235
X25:	Provide users' positives attitudes toward e-commerce system implementation	.653	.692	.157
X27:	Provide users' participation in the e-commerce system implementation	.631	.758	-.181
X28:	Involve users in e-commerce system implementation	.547	.731	-.375

6.5.2.10 Critical Success Factor (CSF)-10: Technological Competence for E-Commerce System

The tenth factor extracted from the 88 e-commerce implementation activities is labelled "Technological Competence for E-Commerce System". This factor is composed of five Internet-based e-commerce implementation activity variables. Those five variables were used as the predictor variables for the canonical correlation analysis. The hypothesis statements for this CSF are:

Ho: *Technological competence is not related to Internet-based e-commerce implementation success.*

Ha: *Technological competence is related to Internet-based e-commerce implementation success.*

The five-predictor variables in this general hypothesis are:

X68: Adequate e-commerce application infrastructure (eg. reliable telecommunications network);
X70: Satisfactory to continually assess emerging Internet/e-commerce capabilities;
X71: Level of Internet/e-commerce system knowledge, experience and expertise;
X72: Adequacy of e-commerce-related knowledge and skills of users and managers throughout the organisation; and
X73: Level of technological readiness and access to technical competence (eg hardware, software, and human resources components, etc).

Table 6.52 presents the factor loading for each variable of e-commerce implementation activities and the results of the canonical correlation analysis. The canonical correlations are high, .965 and .841, and indicate that the relationship between SFAC1 and the five e-commerce implementation activities contributes 96.5 percent to the two linear composites; and the relationship between SFAC2 and the five e-commerce implementation activities contributes 84.1 percent to the two linear composites. The cumulative redundancy index indicates that 83.9 percent of the variance in the criterion variables (SFAC1 and SFAC2) can be explained by the linear composite of the five predictor variables. The significance level of the F-statistic is less than .000. The canonical loadings are high in the canonical function. These results indicate that the null hypothesis is rejected at the significance level of .000, and the research hypothesis has sufficient evidence to be supported.

Thus, technological competence is highly related to Internet-based e-commerce implementation success; and this factor is one of the CSFs for e-commerce implementation success. *This finding also supports the proposed hypothesis that technological competence is related to Internet-based e-commerce implementation success (H9).*

Table 6.52: The Canonical Correlation for CSF-10: Technological Competence for E-Commerce System Implementation

Criterion (Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SFAC1	.965	.000	.611
SFAC2	.841	.000	.228
			Total: .839

Predictor (E-Commerce Implementation Activities)		Factor Loading	Canonical Loading 1	Canonical Loading 2
X68:	Adequate e-commerce application infrastructure (eg. reliable telecommunications network)	.732	.823	-.362
X70:	Satisfactory to continually assess emerging Internet/e-commerce capabilities	713	.765	-.251
X71:	Level of Internet/e-commerce system knowledge, Experience and expertise	.694	.807	.423
X72:	Adequacy of e-commerce-related knowledge and skills of users and managers throughout the organisation	.642	.832	.383
X73:	Level of technological readiness and access to technical competence (eg. hardware, software, and human resources components, etc)	.534	.764	-.212

6.5.3 Prediction Model

Several regression analyses were employed in an attempt to determine the best prediction model for Internet-based e-commerce implementation success. *The stepwise approach was used for all the regression analyses to discover the best prediction model.* The stepwise approach examines the partial correlation coefficients to find an additional predictor variable that explains both a significant portion, and the largest portion of the error remaining from the previous regression equation. In this study, the results of stepwise approach make the independent variables have positive coefficients in the regression equation.

6.5.3.1 Prediction by Internet-based E-Commerce Implementation Activities

The first regression model uses each of the two e-commerce implementation success factors (User-Orientation Improvements and E-Commerce System Effectiveness) as the dependent variable, and the 88 variables of e-commerce implementation activities

as the independent variable (predictor variables). The dependent variable in the first regression equations is SFAC1. SFAC1 is labelled "User-Oriented Improvements" for Internet-based e-commerce implementation success. SFAC1 is the mean of the six Internet-based e-commerce implementation success variables (Y1, Y4, Y7, Y8, Y9, Y12). *By stepwise approach, the results of this regression analysis indicate that three Internet-based e-commerce implementation activities (X82, X67 and X88) are in the regression model.*

Table 6.53 presents the regression model for User-Oriented Improvements. In this regression model, multiple R is .538. This indicates that the correlation between SFAC1 and independent variables (X82, X67 and X88) is 53.8 percent. R-square (coefficient of determination) is .289 and indicates that 28.9 percent of the variance in SFAC1 is explained by the independent variables (X82, X67 and X88). The F-statistic for the regression model is .000, indicating that there is sufficient evidence to support this regression equation. The t-test for each coefficient is less than .022, indicating that each coefficient is significantly different from zero at the significance level of .022 or less.

Therefore, from this equation model, "improve the efficiency of e-commerce system applications for users (X82)", "provide secure and reliable Internet/e-commerce system (X67)", and "provide and promote flexible, adequate and appropriate applications for e-commerce system implementation (X88)", can only be used to explain and predict one part of the Internet-based e-commerce implementation success – User-Oriented Improvements (SFAC1).

Table 6.53: Regression for SFAC1: User-Oriented Improvements

Multiple R = .538	R Square = .289	Significance of F = .000
Dependent variable	SFAC1: User-Oriented Improvements	
Independent variables	Regression Coefficient	Sigma T
X82: Improve the efficiency of e-commerce system applications for users	.273	.000
X67: Provide secure and reliable Internet/e-commerce system	.132	.018
X88: Provide and promote flexible, adequate and appropriate applications for e-commerce system implementation	.113	.022
Constant	2.457	.000

The dependent variable in the second regression equation is SFAC2. SFAC2 is labelled "E-Commerce System Effectiveness" for Internet-based e-commerce implementation success. SFAC2 is the mean of the other six Internet-based e-commerce implementation success variables (Y2, Y3, Y5, Y6, Y10, Y11). By the stepwise approach, the results of this regression analysis indicate that three Internet-based e-commerce implementation activities (X18, X80 and X41) are in the regression model. Table 6.54 presents the regression model for e-commerce system effectiveness.

In this regression model, multiple R is .447. This indicates that the correlation between SFAC2 and independent variables (X18, X80 and X41) is 44.7 percent. R-square is .203 and indicates that 20.3 percent of the variance in SFAC2 is explained by the independent variables (X18, X80 and X41). The F-statistics for the regression model is .000, indicating that there is sufficient evidence to support this regression equation. The t-test for each coefficient is less than .019, indicating that each coefficient is significantly different from zero.

Therefore, from this equation model, "improve access to the e-commerce system (X18)", "reduce the business processing, data and maintenance cycle (X80)", and "provide a high degree of e-commerce integration and consistency across the infrastructure, networks, databases and overall business processes (X41)", can only be used to explain and predict the other part of the Internet-based e-commerce implementation success – E-Commerce System Effectiveness (SFAC2).

Table 6.54: Regression for SFAC2: E-Commerce System Effectiveness

Multiple R = .447	R Square = .203	Significance of F = .000
Dependent variable	SFAC2: E-Commerce System Effectiveness	
Independent variables	Regression Coefficient	Sigma T
X18: Improve access to the e-commerce system	.349	.000
X80: Reduce the business processing, data and maintenance cycle	.184	.012
X41: Provide a high degree of e-commerce integration and consistency across the infrastructure, networks, databases and overall business processes	.126	.019
Constant	2.273	.000

6.5.3.2 Prediction by Extracted Factors

Regression analysis was also performed on the factors generated from the factor analysis. The dependent variables in the regression are the two factors generated from the twelve Internet-based e-commerce implementation success variables (Y1-Y12), SUCCESS-1 and SUCCESS-2.

The independent variables in the regression are the ten factors formulated from the 88 Internet-based e-commerce implementation activity variables. The ten factors are the critical success factors for Internet-based e-commerce implementation that this research proposes. These ten factors are coded: CSF1, CSF2, CSF3, CSF4, CSF5, CSF6, CSF7, CSF8, CSF9, and CSF10.

Table 6.55 shows the labels of the ten CSFs and the canonical correlation results. The canonical correlation for "User-Oriented Improvements (SUCCESS-1)" is .728 and for "E-Commerce System Effectiveness (SUCCESS-2)" is .754. The redundancy index indicates that 32.5 percent of the variance of "User-Oriented Improvements" can be explained by the ten CSFs; and 33.6 percent of the variance of "E-Commerce System Effectiveness" can be explained by the ten CSFs.

The cumulative redundancy index indicates that 66.1 percent of the overall variance of the E-commerce implementation success can be explained by the ten critical success factors. The canonical loadings indicate that CSF2, CSF4, and CSF5 each contributes more than 49 percent for SUCCESS-1; CSF9, CSF6 and CSF8 each contributes more than 52 percent for SUCCESS-2. The following regression analysis ascertains this relationship.

Table 6.55: The Canonical Correlation for E-Commerce Implementation Success and CSFs

Criterion (E-Commerce Implementation Success)	Canonical Correlation	Significance of F-Statistic	Redundancy Index
SUCCESS-1:User-Oriented Improvements	.728	.000	.325
SUCCESS-2:E-Commerce System Effectiveness	.754	.000	.336
			Total: .661

Predictor (Ten Factors Generated from Internet-based E-Commerce Implementation Activity Variables)	Canonical Loading 1	2
CSF1: Management Commitment and Support for E-Commerce Implementation	.217	.314
CSF2: Organisational and Management Objectives for E-Commerce Implementation	.752	-.126
CSF3: Communication between Users and the E-Commerce Department	.198	-.103
CSF4: E-Commerce System Security and Reliability	.567	.285
CSF5: E-Commerce Department's Service Function	.492	-.126
CSF6: Integrating E-Commerce into Existing Business Functions	.314	.563
CSF7: Change Management for E-Commerce System	.138	-.327
CSF8: Appropriate E-Commerce System Applications	.096	.526
CSF9: User Participation and Satisfaction for E-Commerce System	.327	.849
CSF10: Technological Competence for E-Commerce System	.194	-.213

Regression analysis was performed on each success factor (SUCCESS-1 and SUCCESS-2). Table 6.56 shows the regression model for SUCCESS-1 (User-Oriented Improvements) and the variables composed in each factor. In the regression model for SUCCESS-1, the correlation between SUCCESS-1 and the three independent variables (CSF2, CSF4 and CSF5) is 53.2 percent. R-square is .283 and indicates that 28.3 percent of the variance in SUCCESS-1 is explained by the three independent variables (CSF2, CSF4, and CSF5).

The F-statistic for the regression model is .000, indicating that there is sufficient evidence to support this regression equation. The t-test for each coefficient, except for constant, is less than .018, indicating that each coefficient is significantly different from zero at the significance level of .018 or less. The significance level of t-test for the constant is .962. This indicates that the null hypothesis (constant is equal to zero) cannot be rejected, and that the coefficient for the constant is equal to zero.

Therefore, from this equation model, "Organisational and Management Objectives for E-Commerce Implementation (CSF2)", "E-Commerce System Security and Reliability (CSF4)" and "E-Commerce Department's Service Function (CSF5)" can be used to explain and predict one part of Internet-based e-commerce implementation success – 'User-Oriented Improvements (SUCCESS-1)".

Table 6.56: Regression for SUCCESS-1: User-Oriented Improvements

Multiple R = .532	R Square = .283	Significance F = .000
Dependent Variable	SUCCESS-1:User-Oriented Improvements	Factor Loading
	Y8 Improvement in internal/external communications	.8716
	Y12 Improving effective decision making/empowerment of users	.8251
	Y7 Improved overall productivity and efficiency of the users	.7928
	Y4 Improvements in product/service and information quality	.7545
	Y1 Improved system availability, flexibility and usefulness	.7292
	Y9 Higher user/customer satisfaction	.7013
Independent Variables	Regression Coefficient	Sigma T
CSF2: Organisational and Management Objectives for E-Commerce (X11, X42, X44, X45, X46, X47, X49, X76, X80, X82, X85)	.403	.000
CSF4: E-Commerce System Security and Reliability (X17, X59, X60, X61, X62, X63, X64, X65, X66, X67)	.254	.007
CSF5: E-Commerce Department's Service Function (X5, X15, X23, X30, X32, 33, X34, X35, X88)	.133	.018
Constant	-.004	.962

Table 6.57 shows the regression model for SUCCESS-2 and the composed variables of the predictor variables. In this regression model, the correlation between SUCCESS-2 (E-Commerce System Effectiveness) and three independent variables (CSF9, CSF6, and CSF8) is 55.6 percent. R-square is .307 and indicates that 30.7 percent of the variance in SUCCESS-2 is explainable by the independent variables (CSF9, CSF6 and CSF8). The F-statistic for the regression model is .000, indicating that there is sufficient evidence to support this regression equation. The t-test for each coefficient, except for constant, is less than .013, indicating that each coefficient is significantly different from zero at the significance level of .013 or less.

The significance level of t-test for the constant is .947. This indicates that the null hypothesis (constant is equal to zero) cannot be rejected, and that the coefficient for the constant is equal to zero.

Therefore, from this equation model, "User Participation and Satisfaction for E-Commerce System (CSF9)", "Integrating E-Commerce into Existing Business Functions (CSF6)" and "Appropriate E-Commerce System Applications (CSF8)" can be used to explain and predict second part of the Internet-based e-commerce implementation success – 'E-Commerce System Effectiveness (SUCCESS-2)".

Table 6.57: Regression for SUCCESS-2: E-Commerce System Effectiveness

Multiple R = .556	R Square = .307	Significance F = .000
Dependent Variable	SUCCESS-2: E-Commerce System Effectiveness	Factor Loading
	Y2 Simplified and streamlined business processes	.8934
	Y5 Time savings in e-commerce system operations	.7425
	Y6 Cost savings in e-commerce system operations	.7132
	Y3 Improved speed of product/service cycle	.6915
	Y10 Increased sales, revenues and market share	.6637
	Y11 Enhanced competitive advantage	.6273
Independent Variables	Regression Coefficient	Sigma T
CSF9: User Participation and Satisfaction for E-Commerce System (X18, X19, X20, X21, X22, X25, X27, X28)	.346	.000
CSF6: Integrating E-Commerce into Existing Business Functions (X36, X37, X38, X39, X40, X41, X48, X69)	.209	.008
CSF8: Appropriate E-Commerce System Applications (X24, X77, X79, X81, X83, X84, X86, X87)	.175	.013
Constant	-.006	.947

The following chapter presents discussions of results in details.

CHAPTER 7

DISCUSSION OF RESULTS

"In a changing world it is more important to do the right thing in a way that is timely and good enough, than to do the wrong thing well, or the right thing too late"
Miers and Hutton, 1997.

This chapter presents a discussion of the results; possible contributions and limitations of the research.

- The first section presents discussions based on the analysis of the research data.
- The second section describes the potential contributions from this study.
- The third section discusses the limitations of this study.

7.1 DISCUSSION OF RESULTS

As indicated in the previous chapter, the research instrument was a questionnaire that contained four sections (refer to *Appendix-B*) with a total number of 111 questions. The main principle for selecting respondents within a firm was to find persons who have the best insight into the critical success factors of Internet-based e-commerce implementation in their business operations. Therefore, the research subjects were Internet-based e-commerce executives/managers from various Australian companies that were selected randomly from the *Yahoo's Internet Business Directory*.

The chosen sample size was not very big due to the number of Internet-based e-commerce user companies were not much at the time of the beginning of this research. According to the experts it would not expected very large sample size for a new technology related surveys like Internet–based e-commerce, which is still in its infancy. Accordingly, the results are based on the assumption that 530 questionnaires reached the sample subjects. From these 530 questionnaires, 227 were returned for an initial response rate of 42.8 percent. From the 227 returned questionnaires, 213 answered all questions to represent a complete response, yielding a useable response

rate of 40.2 percent. This response rate is high, given the comprehensiveness and length of the instrument when comparing the literature.

The data analysis indicated no response bias due to the similar distribution between the entire sample and the 213 respondent firms. Therefore, the findings reliable and can be used to the population as a whole.

The results of preliminary reliability testing were satisfactory. Each Cronbach's alpha for the proposed hypothesis exceeds .70 (refer to Table 6.15). The posterior reliability testing results were also satisfactory. The lowest Cronbach's alpha for the extracted factors was .7543 (refer to Table 6.22). Thus, none of the items needed to be eliminated from the statistical analysis. The high reliability of the tests suggests that the research instrument is reliable and consistent. Validity testing also shows that most of the variables have a straightforward loading and no questionable variables have been found.

The significant results from canonical correlation analysis support the research hypotheses, both the hypotheses of the originally designed research model and the hypotheses of the ten composite critical success factors (CSFs). The canonical correlations are significant for each hypothesis. Most of the hypotheses have a cumulative redundancy index higher than 80 percent. This means more than 80 percent of the variance of Internet-based e-commerce implementation success can be explained by the particular e-commerce implementation activities. The ten sets of hypotheses for the research model were significantly supported.

The canonical correlation results for Internet-based e-commerce implementation success and the ten CSFs extracted from factor analysis support the originally designed research model. The ten CSFs and their elements are presented again in Table 7.1.

Table 7.1: Components of the Ten CSFs for Internet-based E-Commerce Implementation

CSF1: Management Commitment and Support for E-Commerce	
X1	Top management's sufficient understanding about the goals of e-commerce system implementation
X2	Promote acceptance of the e-commerce implementation concept to the whole firm
X3	Promote support of top management for the e-commerce implementation concept
X4	Design a strategic e-commerce system implementation planning
X6	Top management involvement in the e-commerce implementation efforts and processes
X7	Successful management leadership for implementation efforts
X8	Commitment and support of management to the e-commerce implementation concept
X29	Provide competent e-commerce staff
X43	Attain organisational objectives and strategy for e-commerce system implementation
X53	Provide necessary changes in the human resource policies for implementation
X58	Facilitate the management of change
CSF2: Organisational and Management Objectives for E-Commerce	
X11	Provide coordination through communication of corporate or business departments
X42	Organisational acceptance of e-commerce concept
X44	Provide clearly defined on-line business plan
X45	Improve organisational effectiveness and performance
X46	Increase the quality of decision making
X47	Improve general organisational effectiveness
X49	Adequate organisational commitment and effectiveness
X76	Provide high quality e-commerce databases and Web applications
X80	Reduce the business processing; data and maintenance cycle
X82	Improve the efficiency of e-commerce system applications for users
X85	Promote applications that make e-commerce system business process easier
CSF3: Communication Between Users and E-Commerce Department	
X9	Communicate with users about e-commerce procedures and services
X10	Provide effective communication among the organisational units
X12	Communicate with e-commerce users
X13	Provide training to e-commerce staff and users
X14	Respond to user's request for e-commerce system support
X16	Providing reliable and consistent communication and facilitations to all relevant units
X26	Provide users' understanding of the implemented e-commerce system
X31	Manage E-commerce resources effectively and efficiently
X75	Provide high quality real-time Web-based e-commerce information and data output
X78	Promote high quality applications for the implemented e-commerce
CSF4: E-Commerce System Security and Reliability	
X17	Improve users' confidence in the e-commerce system
X59	Determine, implement and control overall Internet/e-commerce system security needs
X60	Provide clearly stated Internet security policy, standards and adequate user training on the security issues
X61	Provide secure electronic payments infrastructure and convenient delivery mechanism
X62	Provide and ensure adequate user privacy and confidentiality
X63	Provide overall e-commerce system network and data transaction security; data and database integrity
X64	Provide and ensure overall e-commerce system reliability
X65	Provide a reliable Internet Service Provider (ISP) and Web server to access quickly and securely.
X66	Provide quick system access availability and reliable information on time
X67	Provide secure and reliable Internet/e-commerce system

Table 7.1: Continued...

CSF5: E-Commerce Department's Service Function	
X5	Promote users' commitment and support for the e-commerce system implementation concept
X15	Provide information and data sharing among the organisational units
X23	Satisfy user's expectations of the e-commerce system
X30	Develop and provide a basis for control of e-commerce system guidelines, standards and policies, etc.
X32	Provide reliable and qualified e-commerce services, enabling tools and education (training)
X33	Facilitate an increase in the productivity of users and their business processes
X34	Provide adequate control for e-commerce system implementation and plan for maintenance and its costs
X35	Providing the organisational units with information for 24 hours a day and seven days a week
X88	Provide and promote flexible, adequate, and appropriate applications for e-commerce system implementation
CSF6: Integrating E-Commerce into Existing Business Functions	
X36	Provide e-commerce system integration with ongoing (existing) business processes
X37	Provide seamless integration of all supply chain processes and measurements
X38	Integrate e-commerce system with all internal operation functions (eg. order processing)
X39	Integrate e-commerce system with all external operation functions (eg customers, suppliers)
X40	Enhance firm's value-chain integration with e-commerce system
X41	Provide a high degree of e-commerce integration and consistency across the infrastructure, networks, databases and overall business processes
X48	Presence of a dedicated organisational structure
X69	Sufficient understanding about existing data, applications and e-commerce across the organisation
CSF7: Change Management for E-Commerce System Implementation	
X50	Recognise needs for managing change
X51	Sufficient anticipation and planning for organisational resistance to change
X52	Gain cross-functional cooperation for organisational change
X54	Communicate reasons for change to members of the organisation
X55	Provide appropriate employee compensation incentives and training in the new process
X56	Set reasonable expectations attributed to implementation as a solution for all organisational problems
X57	Organisation's ability to cultural and structural transformation for the new system
X74	Ability of the organisation to identify, activate and coordinate its technological and human resources
CSF8: Appropriate E-Commerce System Applications	
X24	Ease the use of e-commerce system tools for users
X77	Select and install quality hardware and the right e-commerce software solution for the intended business operations
X79	Provide up-to-date information content on Web site as part of e-commerce value-added services
X81	Provide efficient data transaction; convenient and widely accepted e-commerce payment system
X83	Provide flexible and user friendly (ease-of-use) e-commerce system applications
X84	Provide availability and easy access to e-commerce system for 24 hours a day 7 days a week
X86	Promote e-commerce system applications that provide competitive edge for the firm
X87	Provide flexible and convenient data transaction and payment methods
CSF9: User Participation and Satisfaction for E-Commerce Implementation	
X18	Improve access (easier and quicker) to the e-commerce system
X19	Improve user productivity by realisation of user requirements
X20	Permit control over e-commerce services by users
X21	Generate user satisfaction with the implemented e-commerce system

Table 7.1: Continued...

X22	Increase the use of implemented e-commerce Systems
X25	Provide users' positives attitudes toward e-commerce system implementation
X27	Provide users' participation in the e-commerce system implementation
X28	Involve users in e-commerce system implementation
CSF10: Technological Competence for E-Commerce Implementation	
X68	Adequate e-commerce application infrastructure (eg. reliable telecommunications network)
X70	Satisfactory to continually assess emerging Internet/e-commerce capabilities
X71	Level of Internet/e-commerce system knowledge, experience and expertise
X72	Adequacy of e-commerce-related knowledge and skills of users and managers throughout the organisation
X73	Level of technological readiness and access to technical competence (eg. hardware, software, and human resources components, etc)

Table 7.2 shows the mapping of the original research model and the ten CSF model extracted from factor analysis. Figure 7.1 also show the result of the CSF model for Internet-based e-commerce implementation.

Table 7.2: The Research Model and the Ten E-Commerce CSFs

Research Model (The Originally Designed Ten Groups)	**Gide's Ten E-Commerce CSFs (Extracted from Factor Analysis)**
H1: Management Commitment and Support	CSF1: Management Commitment and Support for E-Commerce
H2: Communication Between Users and E-Commerce Department H2a: Training and Facilitation for Users	CSF3: Communication Between Users and E-Commerce Department
H3: User Appreciation for E-Commerce H3a: User involvement H3b: User attitude	CSF9: User Participation and Satisfaction for E-Commerce Implementation
H4: E-Commerce Department's Service Function	CSF5: E-Commerce Department's Service Function
H5: Integrating E-Commerce into Existing Business Functions	CSF6: Integrating E-Commerce into Existing Business Functions
H6: Organisational Effectiveness for E-Commerce	CSF2: Organisational and Management Objectives for E-Commerce
H7: Change Management for E-Commerce	CSF7: Change Management for E-Commerce System Implementation
H8: E-Commerce System Security and Reliability H8a: E-Commerce System Security H8b: E-Commerce System Reliability	CSF4: E-Commerce System Security and Reliability
H9: Technological Competence for E-Commerce Implementation	CSF10: Technological Competence for E-Commerce Implementation
H10: Appropriate E-Commerce System Applications H10a: Quality of Applications H10b: Efficiency of Applications H10c: Flexibility and Adequacy of Applications	CSF8: Appropriate E-Commerce System Applications

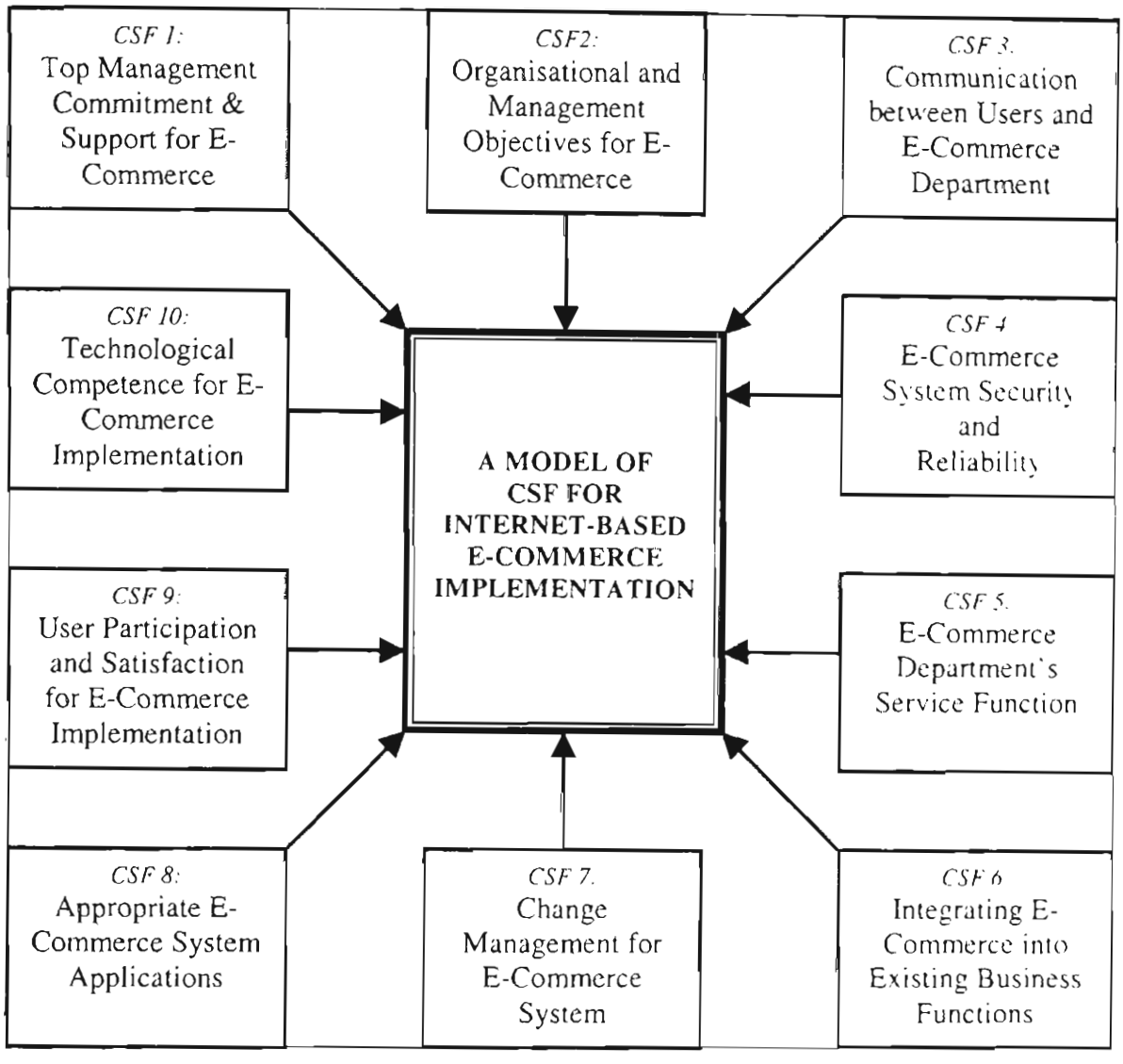

Figure 7.1: The CSF Model of Internet-based E-Commerce Implementation

The ten CSFs can be subjectively mapped with Rockart's CSF and Martin's CSF (refer to Table 6.21 of Chapter 6), and consequently, the ten CSFs support the research model (the originally designed ten sets that determine the CSFs for Internet-based E-Commerce implementation).

Table 7.3 shows that the hypotheses of the originally designed research model have been supported. Table 7.4 also shows that the hypotheses of the ten composite factors are also supported.

Table 7.3: The Original Proposed Research Hypotheses and the Results

Research Hypotheses	Results from Canonical Correlation Analysis
H1: Commitment and support from top management and users are related to Internet-based e-commerce implementation success.	Significantly Supported
H2: Communication between users and e- commerce department is related to Internet-based e-commerce implementation success. H2a: Training and facilitation to users is related to Internet-based e-commerce implementation success.	Significantly Supported
H3: User appreciation is related to Internet-based e-commerce implementation success. H3a: User involvement in the process of e-commerce implementation is related to Internet-based e-commerce implementation success. H3b: Users' attitude towards the e-commerce implementation is related to Internet-based e-commerce implementation success.	Significantly Supported
H4: The support services of an e-commerce department are related to Internet-based e-commerce implementation success.	Significantly Supported
H5: The integrating e-commerce into existing business functions is related to Internet-based e-commerce implementation success.	Significantly Supported
H6: Organisational effectiveness is related to Internet-based e-commerce implementation success.	Significantly Supported
H7: Change management is related to Internet-based e-commerce implementation success.	Significantly Supported
H8: E-commerce system security and reliability is related to Internet-based e-commerce implementation success H8a: E-commerce system security implementation is related to Internet-based e-commerce implementation success. H8b: E-commerce system reliability is related to Internet-based e-commerce implementation success.	Significantly Supported
H9: Technological competence is related to Internet-based e-commerce implementation success.	Significantly Supported
H10: Appropriate e-commerce system software application is related to Internet-based e-commerce implementation success H10a: The quality of applications is related to Internet-based e-commerce implementation success H10b: The efficiency of applications is related to Internet-based e-commerce implementation success H10c: The adequacy of applications is related to Internet-based e-commerce implementation success	Significantly Supported

Table 7.4: The Ten Composite CSFs and the Results

Research Hypotheses	Results from Canonical Correlation Analysis
CSF1: Ha: Commitment and support from top management and users is related to Internet-based e-commerce implementation success.	Significantly Supported
CSF2: Ha: Organisational and management objectives for e-commerce system are related to Internet-based e-commerce implementation success	Significantly Supported
CSF3: Ha: Communication between users and the e-commerce department is related to Internet-based e-commerce implementation success	Significantly Supported
CSF4: Ha: E-commerce system security and reliability is related to Internet-based e-commerce implementation success	Significantly Supported
CSF5: Ha: E-commerce department's service function is related to Internet-based e-commerce implementation success	Significantly Supported
CSF6: Ha: Integrating e-commerce into existing business functions is related to Internet-based e-commerce implementation success	Significantly Supported
CSF7: Ha: Change management is related to Internet-based e-commerce implementation success	Significantly Supported
CSF8: Ha: Appropriate e-commerce system applications is related to Internet-based e-commerce implementation success	Significantly Supported
CSF9: Ha: User participation and satisfaction is related to Internet-based e-commerce implementation success	Significantly Supported
CSF10: Ha: Technological competence is related to Internet-based e-commerce implementation success	Significantly Supported

From research results, prediction models of e-commerce implementation success based on the composite CSF and the individual e-commerce implementation activities can be formulated. The prediction model of e-commerce implementation success from the composite CSF shows that the most important composite CSFs for e-commerce implementation success are:

CSF2: Organisational and Management Objectives for E-Commerce
(X11, X42, X44, X45, X46, X47, X49, X76, X80, X82, X85)

CSF4: E-Commerce System Security and Reliability
(X17, X59, X60, X61, X62, X63, X64, X65, X66, X67)

CSF5: E-Commerce Department's Service Function
(X5, X15, X23, X30, X32, 33, X34, X35, X88)

This implies that a successful implementation of Internet-based e-commerce should focus on these three composite CSFs. For each composite CSF, there are certain critical Internet-based e-commerce implementation activities (refer to Table 7.1). The regression equation implies that an organisation should thus focus on these critical e-commerce implementation activities for a successful Internet-based e-commerce system.

The regression model also supports three originally designed research hypotheses:

- Organisational effectiveness is related to Internet-based e-commerce implementation success (H6),
- E-commerce system security and reliability is related to Internet-based e-commerce implementation success (H8), and
- E-commerce department's service function is related to Internet-based e-commerce implementation success (H4).

These Internet-based e-commerce implementation activities, particularly those elements of CSF2, CSF4, CSF5, should be critical variables for management attention in Internet-based e-commerce implementation success.

The prediction model might not include some important CSFs due to the stepwise approach; because the stepwise approach only selects those variables that are not selected in a previous step. Therefore, e-commerce executives/managers should focus on those e-commerce implementation activities that have apparently been ignored by the management or the organisation.

The other prediction model takes the individual Internet-based e-commerce implementation activities as the predictors. This prediction model shows that the six most important individual e-commerce implementation activities are:

- Improve the efficiency of e-commerce system applications for users (X82),
- Provide secure and reliable Internet/e-commerce system (X67),

- Provide and promote flexible, adequate and appropriate applications for e-commerce system implementation (X88),
- Improve access to the e-commerce system (X18),
- Reduce the business processing, data and maintenance cycle (X80), and
- Provide a high degree of e-commerce integration and consistency across the infrastructure, networks, databases and overall business processes (X41).

These six individual variables can be considered to represent four different groups of the research model:

- "Improve access to the e-commerce system (X18)", is one of the variables for the hypothesis that "user appreciation for e-commerce system is related to Internet-based e-commerce implementation success (H3)".

- "Provide a high degree of e-commerce integration and consistency across the infrastructure, networks, databases and overall business processes (X41)", is one of the variables for the hypothesis that "integrating e-commerce system into the existing business functions is related to Internet-based e-commerce implementation success (H5)".

- "Provide secure and reliable Internet/e-commerce system (X67)", is one of the variables for the hypothesis that "e-commerce system security and reliability is related to Internet-based e-commerce implementation success (H8)".

- "Reduce the business processing, data and maintenance cycle (X80)", "improve the efficiency of e-commerce system applications for users (X82)", and "provide and promote flexible, adequate and appropriate applications for e-commerce system implementation (X88)", are the three variables for the hypothesis that "appropriate e-commerce system applications are related to Internet-based e-commerce (H10)".

This prediction model might only include the variables that were selected in the stepwise approach. Therefore, this research suggests that e-commerce executives/managers should examine Internet-based e-commerce implementation activities according to the importance of the composite CSFs.

That is, "*Management Commitment and Support for E-Commerce*", is the most important criterion, and those e-commerce implementation elements of CSF1 should be the most critical Internet-based e-commerce implementation activities.

Next, "*Organisational and Management Objectives for E-Commerce* (CSF2)" should become the focus along with "*Communication between Users and the E-Commerce Departments* (CSF3)".

7.2 POTENTIAL CONTRIBUTIONS OF THIS RESEARCH

The author of this study empirically researched the possible critical success factors and constructed a model based on those CSFs for successful implementation of Internet-based e-commerce in business operations. The findings from this research support a significant and direct relationship between Internet-based e-commerce implementation and certain critical success factors.

Several benefits and contributions are expected from establishing a CSF model for Internet-based e-commerce implementation success. Some of them are:

- *Providing a checklist for Internet-based e-commerce implementation in business operations*: From the findings of this research (refer to Table 7.1), e-commerce executives/managers can attend to what seems to be the most important activities and select an approach to be more likely to achieve success in Internet-based e-commerce implementation.

  An e-commerce executive/manager may be able to use the findings from this study as a checklist for Internet-based e-commerce implementation. For example,

if an e-commerce manager takes Table 7.1 as a checklist and finds that few or no users are involved in the e-commerce implementation activities, then he/she should set up procedures for increasing users' participation.

- *Providing a general guideline for e-commerce resource management:* E-commerce managers may be able to use the CSF findings (refer to Table 7.1) of this research for better e-commerce resources management, such as investment in hardware, software, and human resources. For example, through communication with users, an e-commerce executive/manager may make a decision for purchasing or developing appropriate e-commerce solutions software for users' needs.

  The elements of "communications between users and the e-commerce department (CSF3)" (refer to Table 7.1) may provide a guideline for this type of communication, ie., "communicate with users about e-commerce procedures and services (X9)", "provide effective communication among the organisational units (X10)", "communicate with e-commerce users (X12)", "provide training to e-commerce staff and users (X13)", "respond to user's request for e-commerce system support (X14)".

- *Identifying information needs*: The CSF may be useful for Internet-based e-commerce executives/managers to identify their information needs. For example, during the communication process between e-commerce top executives/managers and middle or lower level managers, both sides will provide their information needs to each other.

  Through the results of this and similar research it may be that middle or lower level managers will understand more about the effects of Internet-based e-commerce in business operations. Top e-commerce executives/managers will also understand more about the required support services that the middle or lower level managers need in this new medium of business operations.

- *Evaluating the performance of the e-commerce department:* The CSF may be useful as criteria for end-users, executives and managers to evaluate the performance of the e-commerce department, e-commerce managers, chief - Internet/e-commerce officers, or other executives. The CSF provides a potential foundation for successful Internet-based e-commerce implementation. If certain e-commerce implementation activities cannot be achieved, or are being ignored by the e-commerce department, e-commerce managers, chief Internet/e-commerce officers or other executives, one may judge that the e-commerce implementation may not be successful. For example, if users have never been able to "communicate with the e-commerce department (X12)", never been "provided training from the e-commerce department (X13)", and/or never been "made aware of Internet-based e-commerce procedures and services (X9)", users may evaluate that the performance of the e-commerce department is very poor.

- *Evaluating for purposes of e-commerce system planning and control:* The CSF may be useful as evaluation criteria for e-commerce system planning and control. E-commerce executives/managers may be able to take these critical success factors as guidelines for e-commerce system design and control. For example, during e-commerce system design, the results of this study clearly show that "users should be involved in (X27)" or "communicated with about proper control procedures for Internet-based e-commerce implementation (X9)", or that the e-commerce department should "design a strategic e-commerce implementation plan (X4)" for a successful Internet-based e-commerce implementation.

- *Providing a foundation for communication:* The CSF can provide a foundation for communication between the e-commerce department and the user departments as well as improve communication between e-commerce managers and their directors or subordinates. For example, if the e-commerce department recognises that "commitment and support from the users (X5)" is important, then the e-commerce department will try to "provide the required information, support, or services to users (X32)". To find users' needs, the e-commerce department may select several starting points for communication. For example,

communication with users may be initiated by "providing training to users (X13)" and "generate users' understanding of the e-commerce system implementation (X26)".

- *Strengthening organisational goals*: The CSF can help the whole organisation understand the most important criteria and enhance its competitive edge. For example, if an implemented Internet-based e-commerce system "reduces the time for business processing; data and maintenance cycle (X80)", an organisation will get required information faster and/or cheaper. If the information is sensitive to time, then a successfully implemented Internet-based e-commerce system should "provide more prompt and just-in-time information (X86)", thus enhancing the organisation's competitive advantage and position in its business operations.

- *Providing a base for the future research*: As far as the researcher is aware, this is the first study of its kind. That is why this study will provide a general base for the future research. Further research can expand on the findings from this study. For example, the result of this study will provide a base for more narrowly defined research topics - a specific industry, or business type and size. This provides a basis for an interesting future study.

7.3 POSSIBLE LIMITATIONS OF THE RESEARCH

This research is subject to a few possible limitations:

- The first possible limitation is related to the research focus of this study. Since this study is the first of its kind, there is a lack of empirical research and theory in this field, and the researcher tried to establish a base upon which to construct a general CSF model instead of in any particular industry or business type and size. Therefore, a possible future study could conduct a number of case studies in a particular industry type and size to compare and map the results in order to clarify and evaluate this research findings.

- The second possible limitation is due to the research subjects, e-commerce executives and managers. This research takes the approach in which business and industrial e-commerce executives/managers' perception of CSF is the main target. Other approaches could be from end-users' perception (including employees, customers, business partners, suppliers, etc.), the performance of Internet-based e-commerce user organisations, or from the type of Internet-based e-commerce system software solutions in use.

- The third possible limitation is the statistical approach. The stepwise regression procedure allows only one variable to enter the regression equation in each step. In the event that some combination of variables would explain a significant portion of the variance, but no single one is significant by itself, none of them would be included into the regression model. Although studies might take an all-possible-subsets regression approach, there will be a huge number of models to be tested. As a result, the CSF for the prediction model might not be the most uniquely suitable critical success factors; others might also exist. There is no guarantee that the selected CSFs are complete, and completeness is a judgemental limitation of this research.

- Finally, the results of this study should be interpreted and accepted with caution, since the survey data of this study have certain limitations as explained above. The findings of this study is that ten CSFs are related to the strategic success of Internet-based e-commerce implementation in Australian businesses as defined by Internet-based e-commerce executives and managers. Since the subjects of this study are Internet/e-commerce executives and managers from only Australia, cultural differences may exist between countries. Therefore, generalisability limitations exist in terms of country.

CHAPTER 8

CONCLUSION AND RECOMMENDATION

"The Internet is the biggest thing that has happened in telecommunications since the telephone. It is going to become as fundamental to the operations of businesses as having a telephone. You won't be able to be in business- I will give you five years, but I think it will be sooner-without an Internet connection, because there will be so much business conducted that way."(The Business Times, 1996).

James H. Clark, Co-founder and Chairman,
Netscape Communications

8.1 GENERAL

The Internet has grown explosively, more than doubling in recent years. Research shows that there are more than 100 million active users on the Internet around the world. The business sector itself is ripe for more growth, with estimates that there will be more than 200 million users on the Internet by the end of this decade.

The Internet will provide unexpected new opportunities for businesses to change direction and excel. At this stage, the value of the Internet is only beginning to be recognised and explored. It can be said that this is the network that is changing the way of doing business in the world. Businesses use Internet commerce for almost as many reasons as there are businesses. Moreover, since e-commerce implementation is in many cases evolutionary, organisations need to react to change the business process as demand increases.

Therefore, it is a reality that the hottest game on earth right now is the Internet and e-commerce, which at present has a lot of players but few winners. It seems that, in the near future, Internet-based e-commerce will become an essential business medium for any type and size of company as well as for individuals. It is also quite clear that Internet-based e-commerce will improve business processes, efficiency, and accuracy if it is used in the correct way.

Thus, one of the biggest challenges in developing a successful online store-front is choosing the right strategic critical success factors for successful implementation of Internet-based e-commerce. This can make the difference between making money and losing money on the Internet. Since there is not an Internet-based e-commerce implementation panacea, the author of this study put together this guide to help provide companies or further researchers with an analysis of the most critical success factors for implementation of Internet-based e-commerce.

In addition, as mentioned before, an e-commerce business is no less demanding than any other type of business operation, but it is also quite different. Instead of the traditional brick-and-mortar storefront, everything happens in the form of bits and bytes flowing over the Internet and what makes it tick is e-commerce implementation strategies.

To engage in e-commerce, a company needs to develop a Web site and fill it with Web pages that can inform customers, display products, conduct purchase transactions, and provide feedback and results. The most critical decision is determining which e-commerce implementation success factors (CSFs) or strategies a company should follow or use to do all of this.

This research is designed to propose a model for successful implementation of Internet-based e-commerce in business operations. Hence the purpose of this study was to identify, analyse, and develop a comprehensive model of the most important critical success factors (CSFs) for successful implementation of Internet-based e-commerce in business operations.

As a result, this study provides a road map on how to go about making the best Internet-based e-commerce implementation decisions for a company whether small or big in size. This thesis will be the first comprehensive research in this field. The anticipated results will benefit organisations greatly.

8.2 CONCLUSIONS

In considering the important contribution of businesses to the economy, this research is designed to identify the critical success factors (CSFs) for e-commerce implementation over the Internet. It is also designed to establish an effective strategy for companies of any size or industry type in order to proceed with a successful Internet-based e-commerce implementation process.

From the results of the literature survey, the business benefits of Internet-based e-commerce implementation for a small company are similar for a large company. However, the difficulties on Internet-based e-commerce implementation appear to be more critical to small companies owing their smaller sizes and limited resources.

According to the literature, major obstacles to Internet-based e-commerce implementation for companies are both cultural and technical. Cultural issues are the same for firms of any size. Technical issues are high implementation costs, inadequate resources and insufficient external assistance. Thus, companies require more cost-effective and well-planned Internet-based e-commerce implementation process.

In this study, a CSF model has been developed for successful implementation process of Internet-based e-commerce. The fundamental impetus is the commitment required from the people involved in the implementation process. There is also an identified need to ascertain the current situation of the company before any attempt to implementation starts. Companies must examine their own situation and identify the gap between themselves and the successful requirements.

In this study, E-Commerce implementation refers to moving from traditional business operations to electronic operations (e-commerce) via the Internet. Many organisations have implemented Internet-based e-commerce to their business operations to some degree without theoretical or academic rationalisation. Not all Internet-based e-commerce implementation efforts have been successful. So, this

research has empirically identified top ten critical success factors (CSFs) for Internet-based e-commerce implementation success from e-commerce executives/managers' perspective in order to aid interested organisations.

Since no previously published empirical research has been found in the area of successful implementation of Internet-based e-commerce in business operations, the research model has taken into account the classic CSF studies by Rockart (1982) and Martin (1982), along with others identified in newer literature on the Internet and e-commerce. The questionnaires were mailed to 530 Internet/e-commerce executives/managers from various Australian firms randomly selected from the Yahoo Internet Business Directory. 213 of the returned questionnaires were useable, yielding a response rate of 40.2 percent.

As presented in Chapter 1, this research had three objectives:

- The *first objective* was to identify the CSF for Internet-based e-commerce implementation success. Ten CSFs were extracted by factor analysis judged reasonably identifiable and significantly supported by hypotheses testing.

- The *second objective* was to study actual Internet-based e-commerce implementation practices and provide a possible empirical foundation to extend existing limited knowledge concerning Internet-based e-commerce implementation success. The previous chapter (Chapter 7) discussed "the potential contributions" and the next section will also discuss "the possible future studies" for this objective.

- The *third objective* was to develop a prediction model for Internet-based e-commerce implementation success. According to the regression equation, the most important CSFs for Internet-based e-commerce implementation success are "organisational and management objectives for e-commerce system implementation", "e-commerce system security and reliability", and "e-commerce department's service function".

In order to accomplish the objectives, five statistical procedures were used:

- The *first procedure* was to calculate descriptive statistics, which provided demographic information about the respondents. Also, the mean and standard deviations of the 12 Internet-based e-commerce implementation successes (Y1-Y12) and the 88 implementation activities (X1-X88) were presented.

- The *second procedure* utilised the Chi-square goodness-of-fit test to examine possible non-response bias. The test result shows that the survey response is free from non-response bias due to the similarities in the distributions between the entire sample (530) and the 213 respondent firms. Therefore the findings can be applied to the whole population.

- The *third procedure* utilised Cronbach's alpha to examine the reliability of the questionnaire and factor analysis to examine the validity of the questionnaire. All of the variables were reliable and consistent; the smallest Cronbach's alpha exceeded .70. All of the variables are valid; they load obviously.

- The *fourth procedure* utilised canonical correlation analysis to test hypotheses and identify the CSF. All of the research hypotheses were significantly supported. The proposed ten CSFs from the research model: "Management Commitment and Support for E-Commerce", "Communication Between Users and E-Commerce Department", "User Appreciation for E-Commerce", "E-Commerce Department's Service Function", "Integrating E-Commerce into Existing Business Functions", "Organisational Effectiveness for E-Commerce", "Change Management for E-Commerce", "E-Commerce System Security and Reliability", "Technological Competence for E-Commerce Implementation", and "Appropriate E-Commerce System Applications", were statistically significant (significance level of .000) for Internet-based E-Commerce implementation success.

The 10 composite CSFs derived from the factor analysis were also significantly related to Internet-based e-commerce implementation success. In the order of importance, the 10 composite CSFs were:

CSF1: Management Commitment and Support for E-Commerce
CSF3: Communication between Users and E-Commerce Department
CSF9: User Participation and Satisfaction for E-Commerce Implementation
CSF5: E-Commerce Department's Service Function
CSF6: Integrating E-Commerce into Existing Business Functions
CSF2: Organisational and Management Objectives for E-Commerce
CSF7: Change Management for E-Commerce System Implementation
CSF4: E-Commerce System Security and Reliability
CSF10: Technological Competence for E-Commerce Implementation
CSF8: Appropriate E-Commerce System Applications

- The *fifth procedure* utilised multiple regression analysis to develop a prediction model. The prediction model supports the implication that the most important composite CSFs for e-commerce implementation success are:

CSF2: Organisational and Management Objectives for E-Commerce
(X11, X42, X44, X45, X46, X47, X49, X76, X80, X82, X85)

CSF4: E-Commerce System Security and Reliability
(X17, X59, X60, X61, X62, X63, X64, X65, X66, X67)

CSF5: E-Commerce Department's Service Function
(X5, X15, X23, X30, X32, 33, X34, X35, X88)

The potential contributions and limitations were discussed in the previous sections of this chapter. It should be noted that although a few limitations seem to exist, the findings are very clear. The proposed research model was supported by hypotheses testing. The 10 CSFs extracted from factor analysis also significantly supported the research model and the research hypotheses.

As this research assesses the CSFs for Internet-based e-commerce implementation, the results from this empirical study serve as a foundation for further study. Additional research may provide a better understanding, and thereby improve the findings of this research.

8.3 RECOMMENDATIONS FOR FUTURE STUDIES

This research focuses on extracting critical success factors (CSFs) and constructing a comprehensive model for Internet-based e-commerce implementation in business operations. It is hoped that the CSF model, and results presented herein, point to successful implementation of Internet-based E-Commerce in business operations.

The possible risks of Internet-based e-commerce implementation were not measured in this study. There are two reasons for this omission:

- The purpose of this study is mainly to isolate potential success factors, not failure factors; and
- The questionnaire might have been too long if these questions were included, thereby reducing the response rate.

Accordingly, in a fail/success or risk/return relationship, knowing one outcome often gives the other. The possible future study of risk factors may support the findings of this study.

Other studies could compare Internet-based e-commerce implementation performance by the company's industry type, annual sales, number of employees, and years of using Internet-based e-commerce. In other words, a possible future study might or might not find the differences of e-commerce implementation performance among: different types of organisations, different sizes of organisations, and different experiences in Internet-based e-commerce business operations.

Another possible future study is related to the potential problem of agency. That is, a conflict of interests between principals (owners) and agents (managers) (Jensen and Meckling, 1976). Because of different incentives and different management functions, e-commerce managers from different management levels might have different perceptions of Internet-based e-commerce implementation. For example, if a chief Internet/e-commerce officer initiates the e-commerce implementation plan

and also designs and carries out the e-commerce implementation procedures, he/she is more likely to confirm the decision and the results. However, a lower level e-commerce manager who might have to carry out the implementation process and solve the conflicts and problems, might have a different perspective. Consequently, comparing different respondents from different management levels might produce interesting findings for a possible future study.

Briefly, it is suggested that further research be carried out to extend the in-depth study of factors such as entrepreneurial approaches to Internet-based e-commerce implementation among small businesses. Examination of the importance of external factors, such as business culture and technology availability, during the implementation of Internet-based e-commerce is also recommended.

Finally, it should be added that, successful implementation of Internet-based e-commerce needs long lasting management commitment and support along with coordination, collaboration and communication of related agencies for planning, design, construction, implementation, operation and maintenance of the Internet-based e-commerce system.

An appropriate closing quote is offered by Gore (1993):

"Anyone who wants to form a business to deliver information will have the means of reaching customers. And any person who wants information will be able to choose among competing information providers, at reasonable prices. That's what the future will look like—say, in ten to fifteen years" (Gore, 1993).

GLOSSARY OF E-COMMERCE RELATED TERMS

Anchor In hypertext, the object that is highlighted and "clickable." It may be a word, a phrase, or an inline image.

Anonymous FTP A File Transfer Protocol that lets anyone (regardless of whether he or she has a user name or password) transfer files server machine to his or her own.

Archie A keyword search service that searches the directory and file titles of all FTP sites that are indexed.

ASCII The acronym for American Standard Code for Information Interchange; a basic text format most computers can read.

Bandwidth The capacity of communications channel. This is measured in bits per second for a digital channel and hertz foe an analog channel.

BBS An online Bulletin Board System; an electronic place provided by kind strangers or misguided entrepreneurs for people with like interests to post (make public) messages in an ongoing conversation, and to upload and download software and files.

Benchmarking The practice of establishing internal standards of performance by looking to how world-class companies run their businesses.

Binary A numbering system used in computing, which has two as its base. A binary file, as opposed to an ASCII file, makes use of 256 symbols and so does not keep a bit free for error-checking.

Bookmark A Web address in the form of a URL that a user keeps a record of in order to be able to return to it easily.

Browser Usually refers to a World Wide Web client program. Software that enables the user to look at, interact with, and generally "browse" files on the Internet.

Business strategy Long-range plan of an organisation and the methods to be used to achieve its corporate objectives.

Client/server architecture It is a type of distributed architecture where end-user PC's (clients) request services or data from designated processors or peripherals (servers).

CCP Credit Card Processors, provide shared network systems and on-line credit processing systems for individual credit companies. They integrate transactions between merchants, financial institutions, and card companies.

CGI script (Common Gateway Interface) It is a scripting system designed to work with HTTP Web servers. The scripts, usually written in the Perl coding language, are often used to exchange data between a Web server and databases.

Commerce Server Web software that runs some of the main functions of an online storefront such as product display, online ordering, inventory management. Works in conjunction with online payment systems to process payments.

Conversion It is the process of changing from an old system to a new system.

Cookies Snippets of information delivered from a web site to the client's browser, and then stored on the hard drive. Examples are the time of the last visit, or the pages downloaded. "Cookies" can be read by that web site on the next visit.

COS (Commercial Online Service) A provider of content to subscribers. This content may include access to the Internet, but commercial online services (for example, America Online, CompuServe, and Prodigy) are not part of the Internet.

Cracker An individual who uses computers for criminal pursuits. This term is yet in general use, but is current among computer professional and academicians.

CSFs (Critical Success Factors) The small number of factors which are critical to the success of a particular enterprise.

Cryptography The study of mathematical processes useful for keeping data secret by encryption, guaranteeing its provenance, or guaranteeing that its content has been unchanged.

Cybercash A company that developed one of the early payment systems for the Internet. They give away a consumer "wallets". Online merchants using Cybercash software receive orders from shoppers with the "wallet". Orders are sent through the Cybercash server to bank networks for credit card verification.

Cyberspace Fanciful term coined by William Gibson in the novel Neuromancer to describe the sum total of computer-accessible information in the world.

Data confidentiality It makes sure that data are protected and accessible only to authorised people.

Data integrity It is the accuracy and accessibility of data.

Debit Card A cash substitute for consumers. They look like credit cards, but do not provide credit. Amounts for purchases are debited immediately from the user's bank balance.

Decryption The process of reversing encryption; application of a mathematical process to encryption data to restore it to its clear text version.

Digital Certificates Digital IDs used to present credentials online. Digital certificates are issued by companies which act as "trusted third parties." In a SET

transaction, the buyer, the merchant and banks for these parties all have digital certificates.

Digital Coins They can be downloaded to a user's hard drive from an account at a bank. When the shopper wants to pay, a "wallet" pops open on their screen. "Coins" are transferred from the shopper's computer to the online merchant's server. The merchant deposits the "coins" in their bank.

Digital Signature A unique code or bit pattern used to authenticate the sender of a message- not a digital pattern of a person's normal signature.

Digital Wallet Software that stays resident on the hard drive of an online shopper. When they are ready to make a purchase, the "wallet" pops open to reveal payment options. Some "wallets" hold credit cards with encrypted information. Other "wallets" hold digital coins.

Dial-up A connection to a computer that is accomplished by calling on a phone line with a modem.

DNS Domain Name Server, software that converts host names to IP (Internet Protocol) addresses.

Download Transferring files to a client machine from another machine.

Economic analysis Analysis based on the development of cost functions for the processing alternative and the comparison of these functions.

EDI (Electronic Data Interchange) EDI provides electronic formats, which allow for an exchange of business data between companies over networks.

EFT Electronic funds transfer.

E-mail The common way to electronic mail; massages that are addressed to an individual at a computer and sent electronically.

Encryption The process of converting a stream of data into a code that is very difficult to read by anything but a machine or user with a "key" to the code.

Extranet Two or more Intranets connected using TCP/IP; also called shared nets.

Factories of the future 1980s term for factories in which computers would be the basis for high-tech production methods.

FAQ Electronic shorthand for *frequently asked questions*.

File server A computer connected to a network and capable of offering other users on that network access to its file system.

File transfer The movement of a file from one computer to another over a network or via a modem.

FTP (File Transfer Protocol) An application program used to permit the sending or receiving of files (ASCII or binary).

Firewall A dedicated gateway machine with special security precautions used to provide security from outside network connections and dial-in lines.

Fulfillment The physical process of completing a sales transaction by picking inventory, packing, and shipping an order. Also called Order Fulfillment.

Gateway A special purpose computer for internetwork connectivity. Often used as a synonym for router.

Gopher An Internet search-and-display application that reduces all Internet resource "trees" to on-screen menus.

Groupware A class of information systems designed to support person-to-person processes in sharing documents and data, such as many database products.

Hacker This term is often used popularity to refer to individuals involved in criminal pursuits like breaking into computers without proper authorisation.

Home page The main screen in a World Wide Web site. A hypertext page that is the first point of contact with the WWW. A home page presents information about the organisation or individual to whom it belongs and it provides hypertext links to other information that the designer has made available to the WWW.

Host A computer whose primary function is facilitating communications.

HTML Hyper Text Markup Language, the language used to make ordinary text into Web documents. HTML files usually have the extention .HTML or .HTM.

HTTP Hyper Text Transfer Protocol, the agreed-upon standard way for electronic interaction to occur in the transferring of Web documents on the Internet.

Internet A global, interconnected network of networks (and single computers that act as if they were networks). No one organisation has control of the Internet or jurisdiction over it.

Internetoperability The ability of disparate computer systems to send and receive requests for network services across disparate networks in a way that is seamless and transparent to the end user.

Intranet An internal TCP/IP network used for sharing information within the corporation.

IP (Internet Protocol) A communications protocol suite used for interworking, routing, and reliable message delivery.

ISDN (Integrated Services Digital Network) A type of telephone service providing high speed (from 128 Kbps and up) and digital services (multiple phone lines on a single link, conferencing, and many others).

ISP Internet Service Provider.

Issuing Bank Issues the credit to a credit card holder. When sale authorization is requested, the merchant's bank, requests the funds to be transferred from the credit card company, which in turn receives the funds from the issuing bank.

Java It is a programming language originally developed at Sun Microsystems to create software for consumer electronic products. Java creates platform independent applications- it can run on any operating system.

JIT Just in Time, production and inventory control system based on small lot sizes, stable and level production schedules, and focused factories; system of enforced problem solving.

Kbps (Kilo Bits Per Second) A measure of data transmission speed indicating 1024 bits transmitting in one second.

LAN (Local Area Network) A telecommunication network allowing connection of computers, peripherals, and other devices that are in close proximity to one another and are generally owned by the user organisation.

Logistics Management of the movement of materials within a factory, shipment of incoming materials from suppliers, and shipment of outgoing products to customers.

Modem An electronic device for converting between serial data from a computer and audio signal suitable for transmission over telephone lines, distinguished primarily by the maximum speed that it can support.

Mosaic A graphical user interface (GUI) browser for accessing the WWW.

Netscape A commercial development of Mosaic, including functional and security enhancements, which has become the most widely used browser on the WWW.

Network It is a telecommunications system that permits the sharing of resources such as computing power, software, input/output devices, and data.

Newsgroups Usenet message areas, each of which is focused on a particular topic.

Online Data entry inputs data directly to and is immediately used by a computer.

Operational efficiency The use of a particular information technology application has given the organisation an increase in the cost-effective operation of its business.

Operations strategy Plan for achieving the operations objective for a major product line.

Opportunity cost Cost in the form of profits forgone.

Order entry An order entry (or order processing system) is one in which the customers' orders are fed to a database that initiates the shipping of orders.

Performance How well the product or service performs the customer's intended use. For example, the speed of an passenger airplane.

PPP Point-to-Point Protocol, a convention for transmitting packet-switched data.

POM Production and operations management, management of an organisation's production system, the primary function of which is to convert inputs into the outputs that are the organisation's products or services.

Protocol An agreed-upon way for an interaction to occur.

Real-time The Internet term that means *live*, as in "real-time conversation" (a *chat*).

Reliability The extent to which users can rely on a system to be functional when they need it.

Responds time It refers to the time a user has to wait between the time at which a request is made, a character is typed, or a command is sent to the system and the time at which the system responds.

Secret key A key must be kept secret. The term is sometimes used to refer to the private key in asymmetric cryptography (public key cryptography), but more properly refers to a shared secret between parties who use the same key to encrypt and decrypt messages.

SET (Secure Electronic Transaction) A security standard that defines security Internet transactions by credit card. Built by MasterCard International and VISA International.

Server A computer that serves; the computer that provides stuff to a client.

.SIG or signature file A short text file that you habitually use as your personal sign-off at the end of e-mail and /or Usenet postings.

SLIP Serial Line Internet Protocol, a convention for transmitting packet-switched data.

SSL (Secure Socket Layer) A protocol first developed by Netscape and subsequently provided to the rest of the Internet community to add encryption and authentication at the network layer just below the application level.

Smart cards They are storage mediums the size of a credit card that contain a microprocessor capable of recording and storing information.

Strategic decision Long-range, one-time, complex decision about a product, process, or facility.

TCP (Transmission Control Protocol) The protocol defining the way applications communicate with each other across the Internet. TCP is a reliable protocol, meaning that all transmissions between applications must be acknowledged by the recipient.

TCP/IP Transmission Control Protocol/Internet Protocol, shorthand for the most common packed-switching protocols used on the Internet.

TELNET An application program used on the Internet to log in to a remote computer.

Time to market The time duration between conception of a new product or service through the design, engineering, and construction phases until final delivery of the product or service to the end customer.

TQM (Total quality management) It is an organisation-wide effort to improve quality and make it the responsibility of all employees.

UNIX An operating system developed by Dell Laboratories for multi-tasking on mini-computers, and later on microcomputers and mainframes.

Upload To transfer files from one machine to another one.

URL (Universal Resource Locator) An address or a location of a document on the World Wide Web.

USENET A worldwide network exchanging "articles" or messages posted by individual contributors grouped under subject categories called "newsgroups." Most newsgroups are open, and anyone may contribute.

User A user, as distinct from an end system, is an entity authorised to accept a supplementary service.

VAN (Value added networks) They are communications providers that add communications services to existing, common carriers.

Veronica An online keyword searcher for the Gopher.

Virtual corporations They may operate from various locations, usually through telecommunications, without a permanent head-quarters.

Virtual reality It is a pseudo-3D interactive technology which provides a user with a feeling that he or she is physically present in a computer-generated world.

WAIS (Wide Area Information Service) An application program used on the Internet to search indexed database archives using keyword searches to find articles or information of interest.

WAN (Wide Area Network) A telecommunication network allowing connection of computers, peripherals, and other devices, such as telephone and fax, that are at a distance from one another.

Web browser A user interface to the Web. For example, Netscape Navigator is a graphical Web browser.

Web Crawler Software that searches the Web (or, more commonly, a database derived from the Web) for keywords input by a user.

Web page Coherent document that is readable by a Web browser.

World-class company Each product and service would be considered best-in-class by its customers.

WWW (World Wide Web) A highly flexible information service available on the Internet that provides ready access to a full range of Internet resources from various locations in an easy to use hypertext format. The WWW uses a "browser," an application program to "browse" through and coordinate Internet resources.

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APPENDICES

APPENDIX A

CLASSIFICATION OF INTERNET-BASED E-COMMERCE IMPLEMENTATION SUCCESS FACTORS BASED-ON LITERATURE REVIEW

Appendix A: Classification of Internet-Based E-Commerce Implementation Success Factors Based-On Literature Review

Section 1: IS/E-Commerce System Performance and Effectiveness	
Improvements in product/service quality	Laudon and Laudon (1997); Chellappa et al. (1997), Tham and Peng (1997); Kekre and Mukhopadhay (1992); Raymond and Bergeron (1996); Hoffman et al. (1995); Scacchi (1995); Cockburn and Wilson (1996); Spar and Bussgang (1996); Seng (1996); Fojt (1996); May (1996); Gray (1996); Senn (1996); Cooper (1996); Abell and Lim (1996); Hoffman et al. (1996), Birch (1997); Keen and Ballance (1997), Birch and Young (1997); Feher and Towell (1997); Fischer (1997); Copeland and Hwang (1997); Bergeron et al. (1993); DeLone and McLean (1992) Ferguson and Dickinson (1982); Miller and Doyle (1987); Raghunathan et al. (1989); Tait and Vessey (1988)
Improved production or service and purchasing cycles	Li (1997); Bailey and Pearson (1983); Raymond and Bergeron (1996); Mougayar (1996); Kekre and Mukhopadhay (1992), Mukhopadhay et al. (1995); Fuller and Jenkins (1995), Laudon and Laudon (1997); Mougayar (1996); Kalakota and Whinston (1996, 1997)
Decreased transaction time	Cronin (1994, 1996); Laudon and Laudon (1997); Kekre and Mukhopadhay (1992); Mougayar (1996); Kalakota and Whinston (1996, 1997); Prakash (1996)
Time saving of new system development	Raymond and Bergeron (1996); Prakash (1996); Mukhopadhay et al. (1995); Bergeron et al. (1993); Dagenais (1991); Ehrenreich (1992); Ferguson and Dickinson (1982), Martin (1982), Miller and Doyle (1987); Raghunathan et al. (1989); Rowley and Smiley (1991); Tait and Vessey (1988); Zahedi (1987); Hoffman et al. (1995); Scacchi (1995); Cockburn and Wilson (1996), Spar and Bussgang (1996); Seng (1996); Fojt (1996); May (1996); Gray (1996); Senn (1996); Cooper (1996); Abell, and Lim (1996); Hoffman et al. (1996); Birch (1997), Keen and Ballance (1997), Birch and Young (1997); Feher and Towell (1997), Fischer (1997); Copeland and Hwang (1997)
Inventory reduction	Cronin (1994, 1996); Raymond and Bergeron (1996), Kekre and Mukhopadhay (1992); Laudon and Laudon (1997), Mukhopadhay et al. (1995); Mougayar (1997), Kalakota and Whinston (1996, 1997)
Flexibility of system for business operations	Li (1997); Teo and King (1996); Mougayar (1997), Laudon and Laudon (1997); Prakash (1996); Raymond and Bergeron (1996); Mukhopadhay et al. (1995); Bergeron et al. (1993); Ives and Olson (1984); Klein (1990,1991); Miller and Doyle (1987); Abell and Lim (1996); Lymer et al. (1996); Sieber (1996a, 1996b), Swanson (1974); Kwon and Zmud (1987),
Cost-effectiveness of IS resource management	Cronin (1996); Raymond and Bergeron (1996), Ehrenreich (1992); Martin (1982); Miller and Doyle (1987); Laudon and Laudon (1997); Zahedi (1987)
System availability and timely response	Mougayar (1996); Mukhopadhay et al. (1995); Laudon and Laudon (1997); Bergeron, et al. (1993); Ehrenreich (1992), Ferguson and Dickinson (1982); Ives and Olson (1984); Klein (1990,1991); Magal and Carr (1988); Martin (1982), Miller and Doyle (1987); Raghunathan et al. (1989); Rowley and Smiley (1991); Zmud (1979); Goodman et al. (1994); Kahn (1994), Kline (1996); Ives and Jarvenpaa (1996)

Cost saving in business operations and maintenance (Low operational costs)	Mougayar (1997); Iacovou et al. (1995); Raymond and Bergeron (1996); Prakash (1996); Mukhopadhay et al. (1995), Poon and Swatman (1995); Laudon and Laudon (1997); Bergeron et al. (1993); Hoffman et al. (1995); Scacchi (1995); Cockburn and Wilson (1996); Spar and Bussgang (1996); Seng (1996), Fojt (1996); May (1996); Gray (1996); Senn (1996); Cooper (1996); Abell and Lim (1996); Hoffman et al. (1996); Birch (1997); Keen and Ballance (1997); Birch and Young (1997); Feher and Towell (1997); Fischer (1997); Norton and Smith (1998), Copeland and Hwang (1997)
Improved decision making	Mougayar (1997); Laudon and Laudon (1997); Rowley and Smiley (1991); Soh et al. (1997); Kalakota and Whinston (1996, 1997); Senn (1996); Keen and Balance (1997); Crocker (1997)
Increase overall productivity	Li (1997); Chellappa et al. (1997); Tham, and Peng (1997); Fuller and Jenkins (1995); Ehrenreich (1992); Ferguson and Dickinson (1982); Raghunathan et al. (1989); Hoffman et al. (1995), Scacchi (1995); Cockburn and Wilson (1996); Spar and Bussgang (1996); Seng (1996); Fojt (1996); May (1996); Gray (1996); Senn (1996); Cooper (1996); Abell, and Lim (1996), Hoffman et al (1996); Birch (1997); Keen and Ballance (1997), Birch and Young (1997); Feher and Towell (1997); Fischer (1997), Copeland and Hwang (1997); Senn, 1996); Bournellis (1995), Laudon and Laudon (1997); Bailey and Pearson (1983), Hamilton and Chervany (1981a, 1981b); Cameron and Whetten (1983), Iivari and Ervasti, 1994); Lucas and Baroudi (1994), Lucas et al (1988)
Improved operational and human-based efficiency	Cronin (1994, 1996); Mougayar (1996); Kalakota and Whinston (1996, 1997); Dahl and Lesnick (1996); Laudon and Laudon (1997); Crocker (1997); Collin (1997); Keen and Ballance (1997)
Understanding and reply to user's (employee and customer) priority	Laudon and Laudon (1997); Magal and Carr (1988), Martin (1982); Miller and Doyle (1987); Raghunathan et al. (1989), Rockart (1979, 1982); Zahedi (1987); Hamilton and Chervany (1981a, 1981b); Cameron and Whetten (1983)
Improved internal and external (global) communications and easy access to knowledge and information (Significant gain in speed of communications, especially for international communications)	Levitt (1995); Laudon and Laudon (1997); Barker (1994), Cronin (1994, 1996); Hills (1997); Kalakota and Whinston (1996, 1997), Mougayar (1997); Fuller and Jenkins (1995); Mukhopadhay et al (1995); Hoffman et al. (1995); Scacchi (1995), Cockburn and Wilson (1996); Spar and Bussgang (1996); Seng (1996); Fojt (1996); May (1996); Gray (1996); Senn (1996); Cooper (1996); Abell, and Lim (1996); Hoffman et al. (1996), Birch (1997), Keen and Ballance (1997); Birch and Young (1997); Feher and Towell (1997); Fischer (1997); Copeland and Hwang (1997); Soh et al (1997); Iacovou et al. (1995); Poon and Swatman (1995); Elliot (1990)
Run applications more quickly and efficiently	Birch (1997); Aldridge et al. (1997); Cockburn and Wilson (1996); Bergeron, et al. (1993); Senn (1996); Keen and Balance (1997); Ehrenreich (1992); Miller and Doyle (1987); Swanson (1974); Cameron and Whetten (1983); Crocker (1997)
Improved manufacturing management	Mathieu and Dickerson (1995); Cronin (1994, 1996), Upton and McAfee (1996); Mackay (1996); Hinkkanen et al. (1997), Soh et al. (1997); Kalakota and Whinston (1996)
Makes users/employees more effectives (Increased job satisfaction)	Laudon and Laudon (1997); Teo and King (1996); Hills (1997); Mukhopadhay et al. (1995); Grengard (1996); DeLone and McLean (1992); Iivari and Ervasti, 1994), Lucas and Baroudi (1994); Lucas et al. (1988); Lucas (1981) Zmud (1983); Fuller and Jenkins (1995); Cockburn and Wilson (1996), Birch (1997)

Simplifying and streamlining business processes	Kalakota and Whinston (1996, 1997); Mougayar (1997); Cronin (1994, 1996); Dahl and Lesnick (1996); Cockburn and Wilson (1996); Birch (1997); Senn (1996); Keen and Balance (1997); Callon (1996); Seng (1996); Crocker (1997); Collin (1997), Ellsworth and Ellsworth (1994, 1996); Aldridge et al. (1997)
Increased in user/customer value	Laudon and Laudon (1997), Teo and King (1996); Fuller and Jenkins (1995); Hall et al. (1993); Hoffman et al. (1995); Scacchi (1995); Cockburn and Wilson (1996); Spar and Bussgang (1996), Seng (1996); Fojt (1996); May (1996); Gray (1996); Senn (1996); Cooper (1996); Abell and Lim (1996); Hoffman et al. (1996), Birch (1997); Keen and Ballance (1997); Birch and Young (1997); Feher and Towell (1997); Fischer (1997); Copeland and Hwang (1997); Soh et al. (1997); DeLone and McLean (1992)
Obtaining competitive advantage and intelligence	Cronin et al. (1994); Fuller and Jenkins (1995); Barker (1994) Graef (1995); Pawar and Sharda (1997); Nejmeh (1994); Seng (1996); Sola (1996); Cronin (1994, 1996); Poon and Swatman (1995); Kapur (1996); Reddy (1990)
Improved in human resources management	Grengard (1996); Teo and King (1996); Laudon and Laudon (1997)
Improved marketing management	Cronin (1994); Barker (1994) Forcht and Wex (1996), Quelch and Klein (1996); Heinen (1996); Herbig and Hale (1997), Tjostheim and Aanonsen (1997); Aldridge et al. (1997), Adam and Wesrberg (1998); Soh et al. (1997); Barker (1994)
Improved business operations management	Hoffman et al. (1995); Cronin (1994); Laudon and Laudon (1997); Scacchi (1995); Cockburn and Wilson (1996); Spar and Bussgang (1996); Seng (1996); Fojt (1996); May (1996), Gray (1996); Senn (1996); Cooper (1996); Abell and Lim (1996), Hoffman et al. (1996); Birch (1997); Keen and Ballance (1997); Birch and Young (1997); Feher and Towell (1997); Fischer (1997); Copeland and Hwang (1997), Cronin et al. (1994); Benjamin and Wigand (1995), Hoffman and Novak (1996), Quelch and Klein (1996); Kalakota and Whinston (1996, 1997), Fischer (1997); Hirschhorn and Gilmore (1992), Senn (1996); Bournellis (1995)
Quick and easy way of providing information on a company and its products, internally and externally	Cronin (1994, 1996); Kalakota and Whinston (1996, 1997); Senn (1996); Mougayar (1997), Keen and Ballnace (1997), Prakash (1996); Aldridge et al. (1997); Quelch and Klein (1996); Laudon and Laudon (1997)
Empowering users	Levitt (1995); Cronin (1994, 1996); Gates (1995)
Closer relations with remote employees, customers and suppliers	Cronin (1994, 1996); Mougayar (1997), Aldridge et al. (1997), Birch (1997); Crocker (1997); Cockburn and Wilson (1996), Collin (1997); Kalakota and Whinston (1996, 1997); Senn (1996)
Higher customer /user satisfaction (Better customer service and better customer/user support)	Cronin (1994); Laudon and Laudon (1997); Teo and King (1996); Iacovou et al. (1995); Soh et al. (1997) Poon and Swatman (1995); Brockway and Hurley (1998), Hamilton and Chervany (1981a, 1981b); Ehrenreich (1992); Barker (1994); Kalakota (1997); Aldridge et al. (1997)
Generating new revenues	Teo and King (1996); Mougayar (1997); Cronin (1994, 1996) Negropente (1997); Fuller and Jenkins (1995), Ellsworth and Ellsworth (1994, 1996); Dahl and Lesnick (1996); Cockburn and Wilson (1996); Collin (1997); Senn (1996); Aldridge et al (1997); Kalakota and Whinston (1996, 1997)

Opens up new global business opportunities (alternative sales channels)	Cronin (1994, 1996); Fuller and Jenkins (1995), Ellsworth and Ellsworth (1994, 1996); Dahl and Lesnick (1996); Mougayar (1997); Cockburn and Wilson (1996); McKeown and Watson (1996); Kalakota and Whinston (1996, 1997); Vassos (1996); Collin (1997); Nemzow (1997); Goldsworthy (1997); Khalil (1997); Hoffman et al. (1995, 1997), Scacchi (1995), Cockburn and Wilson (1996); Kosiur (1997); Neuman and Medvinsky (1997); Spar and Bussgang (1996); Seng (1996); Fojt (1996); May (1996); Gray (1996); Senn (1996); Cooper (1996); Abell and Lim (1996); Hoffman et al. (1996); Birch (1997); Keen and Ballance (1997); Birch and Young (1997); Feher and Towell (1997); Fischer (1997); Copeland and Hwang (1997); Ford and Baum (1997); McKnight and Bailey (1997); Norton and Smith (1998); Senn (1996); Bournellis (1995), Crocker (1997); Norton and Smith (1998); Laudon and Laudon (1997)
Section 2: Management Commitment and Support for E-Commerce System	
Management's sufficient understanding (knowledge) about e-commerce implementation	Li (1997); Senn (1992); Hall et al. (1993); Hammer and Stanton (1995); Grohowski, et al. (1990); Bailey and Pearson (1983), Hoopes (1995); LaPlante (1994); DeLone (1988); Laudon and Laudon (1997)
Successful management leadership for implementation efforts	Hall et al. (1993); Senn (1992); Li (1997); Turban et al. (1996), Bailey and Pearson (1983); Hammer and Stanton (1995), Hoopes (1995)
Sufficient understanding about the goals of top management in relation to implementation	LaPlante (1994); Senn (1992); Hall et al. (1993), Li (1997); Hammer and Stanton (1995); Bailey and Pearson (1983), Dickson and Simmons (1970); Hoopes (1995), Ein-Dor and Segev (1988)
Top manager's success to support the new values and beliefs demanded by the system implementation	Hall et al. (1993); Li (1997); Hammer and Stanton (1995), Grohowski, et al. (1990); Senn (1992); Hoopes (1995), Bailey and Pearson (1983), Yaverbaum (1988); King, et al. (1989)
IS/e-commerce implementation project champion	Hall et al. (1993); Hammer and Stanton (1995); Li (1997), Hoopes (1995); Runge and Early (1988)
Commitment of managers to the IT/IS/e-commerce concept	Ruth and Schware (1996); Mougayar (1997), Kalakota (1997), Vollman et al. (1992); Yap et al. (1992), Cragg and King (1993); Harrington (1991); McLeod and Smith (1996), Levitt (1995); Callon (1996); Turban et al. (1996); Iivari (1987), Norton and Smith (1998); Magal and Carr (1988); Li (1997); Magal et al. (1988); Rockart (1979, 1982); Gremillion (1982), Yaverbaum (1988); White and Manning (1998); Zahedi (1987); Abdul-Gader (1990); Elliot (1990); Laudon and Laudon (1997); Zmud and Cox (1979)
Strategic IT/IS/e-commerce implementation planning	Skagen (1989); Bergeron et al. (1993); Li (1997); Dagenais (1991); Bailey and Pearson (1983); Miller and Doyle (1987), Raghunathan et al. (1989)
Set the organisation's direction for new system	Hills (1997); LaPlante (1994); Li (1997), Bailey and Pearson (1983)
Encourage and support people in their use of the new system	Li (1997); Hills (1997), Turban et al. (1996); Bailey and Pearson (1983); Hamilton and Chervany (1981a, 1981b), Gremillion (1982)
Organisational acceptance of IT/IS/e-commerce concept	Li (1997); Levitt (1995); Ives and Olson (1984); Bailey and Pearson (1983); Magal and Carr (1988); Magal et al. (1988), Martin (1982); Miller and Doyle (1987)

Top management involvement and support in the implementation efforts and processes	Ruth and Schware (1996); Mougayar (1997); Kalakota (1997), McLeod and Smith (1996); Vollman et al. (1992), Harrington (1991); Levitt (1995); Li (1997); Turban et al. (1996); Levitt (1995); Banerjee and Golhar (1994); Ives and Olson (1984), Laudon and Laudon (1997); Magal and Carr (1988), Magal et al. (1988); Martin (1982); Miller and Doyle (1987); Raghunathan et al. (1989); Rockart (1979, 1982); Yaverbaum (1988); Zahedi (1987); Zmud (1979); Iivari (1987), Abdul-Gader (1990), Abdul-Gader (1990); King et al. (1989); DeLone (1988); Westin et al. (1985); Bikson et al. (1988); Hall et al. (1993); Hammer and Stanton (1994); Hoopes (1995); Grover et al. (1995), Yap et al. (1992); Cragg and King (1993); Martinez (1995), Bhatnagar (1990), Li (1997); Lu et al. (1988), Bailey and Pearson (1983)
Section 3: Communication between IS/E-Commerce Department and Users	
Improve communication of IT/IS/e-commerce services with users	Li (1997); Mougayar (1997); Rainer et al (1992); Magal and Carr (1988); Magal et al. (1988); Laudon and Laudon (1997), Rockart (1979, 1982); Rowley and Smiley (1991); Bergeron et al. (1993), Ives and Olson (1984); Miller and Doyle (1987), Grohowski et al (1990); Rockart (1982); Ferguson and Dickinson (1982), Ives and Olson (1984)
Coordination through communication of corporate or business departments	Mougayar (1997); Rainer et al. (1992)
Provide sufficient communication between implementation team members and other organisational members	Callon (1996); Rainer et al. (1992); Elliot (1990); Bailey and Pearson (1983); Li (1997)
Provide amount of data sharing and routine communication needed among organisational units	Callon (1996); Li (1997); Bailey and Pearson (1983), Datt and Lengel (1986)
Section 3.1: Training and Facilitation for Users	
Provide training to IS/e-commerce staff including other department's executives and users	Hills (1997), Mougayar (1997); Turban et al (1996), Levitt (1995); Laudon and Laudon (1997); Callon (1996), Abdul-Gader (1990); Rainer et al. (1992), Dagenais (1991); Hylas, et al (1989); Ives and Olson (1984); Magal and Carr (1988), Magal et al. (1988); Miller and Doyle (1987); Tait and Vessey (1988); Yaverbaum (1988); Grohowski, et al. (1990); Lyytinen and Hirschheim (1987); DeLone (1988); Westin et al. (1985); Bikson et al. (1988); Bostrom and Heinen (1977); Rockart (1982); Ferguson and Dickinson (1982)
Supply and support required software packages	Rainer et al. (1992); Dagenais (1991); Magal and Carr (1988), Magal et al. (1988), Martin (1982); Grohowski et al. (1990), King et.al. (1989); Rockart (1982); Ferguson and Dickinson (1982); Ives and Olson (1984)
Providing the organisational units with information for 24 hours a day and seven days a week	Li (1997); Cronin (1994, 1996); Bailey and Pearson (1983), Ives and Jarvenpaa (1991a); Callon (1996), King (1983)
Respond to user's request of IT/IS/e-commerce support	Callon (1996); Li (1997); Mougayar (1997), Martin (1982); Rockart (1979, 1982); Rowley and Smiley (1991), Elliot (1990)
Providing reliable and consistent services to all relevant units	Callon (1996); Mougayar (1997); Ives and Jarvenpaa (1991a), Grohowski et al. (1990); Rockart (1982), Ferguson and Dickinson (1982); Ives and Olson (1984)

Section 4: User Appreciation of IS/E-Commerce System Implementation	
Section 4.1: User Satisfaction for IS/E-Commerce Implementation	
User satisfaction	Li (1997); Bergeron et al. (1993); Bailey and Pearson (1983), Cavaye (1995); Ferguson and Dickinson (1982), Raghunathan et al. (1989); Zmud (1979); Hufnagel (1990); Yaverbaum (1988); Barki and Hartwick (1994);
User confidence in system	Laudon and Laudon (1997); Li (1997); Ives and Olson (1984), Bailey and Pearson (1983); Magal and Carr (1988); Magal et al. (1988); Miller and Doyle (1987), Griffith and Northcraft (1993); Cooper and Zmud (1990); Goodman and Griffith (1991),
Easier and quicker access to system	Cavaye (1995); Bergeron et al. (1993); Bailey and Pearson (1983); Li (1997); Ehrenreich (1992); Miller and Doyle (1987), Rivard and Huff (1984, 1988)
Improved user productivity	Li (1997); Bergeron et al. (1993); Li (1997); Raghunathan et al. (1989); Bailey and Pearson (1983), Rivard and Huff (1984, 1988); Rowley and Smiley (1991)
User's control over IS/e-commerce services	Cavaye (1995); Li (1997); Bergeron et al. (1993); Ehrenreich (1992), Bailey and Pearson (1983), Miller and Doyle (1987); Rivard and Huff (1984, 1988)
Realisation of user requirements	Barki and Hartwick (1994); Li (1997); Bailey and Pearson (1983); Cavaye (1995); Gremillion (1982)
Section 4.2: User's Positive Attitude for IS/E-Commerce Implementation	
User's positive attitude	Ruth and Schware (1996); Lucas et al. (1990); Benbasat et al 1980); Li (1997); Ginzberg (1981); Hamilton and Chervany (1981a, 1981b); Rivard and Huff (1984, 1988); Tait and Vessey (1988); Yaverbaum (1988); Hufnagel (1990), Griffith and Northcraft (1993); Cooper and Zmud (1990); Goodman and Griffith (1991); Lind and Zmud (1991); DeLone (1988); Barki and Hartwick (1994); Cavaye (1995)
Increase in the use of existing information systems	Li (1997); Benbasat et al. (1980); Bailey and Pearson (1983), Bergeron et al. (1993), Rivard and Huff (1984, 1988); Zmud (1979)
Users develop their own applications	Benbasat et al. (1980); Li (1997); Bailey and Pearson (1983), Bergeron et al. (1993); Magal and Carr (1988); Magal et al (1988); Zmud (1979)
Efficient use of tools by the users	Li (1997); Bailey and Pearson (1983), Bergeron et al (1993), Miller and Doyle (1987); Rivard and Huff (1984, 1988); Franz and Robey (1987)
User's expectations from the IS/E-commerce system	Hufnagel (1990); Lucas et al. (1990); Lucas (1981); Benbasat et al. (1980); Li (1997); Franz and Robey (1987), Bailey and Pearson (1983); Ein-Dor and Segev (1988)
Section 4.3: User Involvement for IS/E-Commerce Implementation	
Involving users for IS/E-commerce implementation	Turban et al. (1996); Ruth and Schware (1996); Cavaye (1995), Li (1997); Laudon and Laudon (1997); Lucas et al. (1990), Franz and Robey (1987); Iivari (1987); Bailey and Pearson (1983), Ferguson and Dickinson (1982), Ginzberg (1981), Ives and Olson (1984); Raghunathan et al. (1989); Tait and Vessey (1988), Yaverbaum (1988); Griffith and Northcraft (1993), Cooper and Zmud (1990); Goodman and Griffith (1991); Miller and Doyle (1987); Montazami (1988); Baroudi et al. (1986); Schewe (1976); Barki and Hartwick (1994), Cavaye (1995), Montazemi (1988), Baroudi et al. (1986) Davis and Olson (1985)

Users' understanding of IS/E-commerce system	Laudon and Laudon (1997); Lind and Zmud (1991); Bikson and Gutek (1984); Griffith (1993); Franz and Robey (1987); Bailey and Pearson (1983); Iivari (1987); Dagenais (1991); Li (1997); Ginzberg (1981); Ives and Olson (1984); Magal and Carr (1988); Magal et al. (1988); Miller and Doyle (1987); Munro and Wheeler (1980); Rivard and Huff (1984, 1988); Rockart (1979, 1982); Tait and Vessey (1988); DeLone (1988); Lucas (1981)
User participation in IS/E-commerce implementation	Ruth and Schware (1996); Laudon and Laudon (1997); Hufnagel (1990); Baroudi et al. (1986); Li (1997); Lucas et al. (1990); Franz and Robey (1987); Bailey and Pearson (1983); Iivari (1987); Ginzberg (1981); Ives and Olson (1984); Barki and Hartwick (1994); Miller and Doyle (1987); Raghunathan et al. (1989); Rivard and Huff (1984, 1988); Tait and Vessey (1988); Yaverbaum (1988); Lind and Zmud (1991); Cavaye (1995); Montazemi (1988); Baroudi et al. (1986) Davis and Olson (1985)
Section 5: IS/E-Commerce Department's Service Function	
Provide competent staff	Turban et al. (1996); Bikson and Gutek (1984); Griffith (1993); Bailey and Pearson (1983); Gremillion (1982), Dagenais (1991), Hamilton and Chervany (1981); Magal and Carr (1988); Magal et al. (1988); Miller and Doyle (1987); Grohowski et al (1990); Rockart (1979, 1982); Tait and Vessey (1988); Zahedi (1987), Lyytinen and Hirschheim (1987); Griffith and Northcraft (1993), Cooper and Zmud (1990); Goodman and Griffith (1991), King et al. (1989)
Develop and communicate IS/e-commerce guidelines, standards and policies	Hills (1997); Prakash (1996); Laudon and Laudon (1997); Bailey and Pearson (1983); Grohowski et al. (1990)
Set up and ensure the control of IS/e-commerce standards and policies	Dagenais (1991); Hamilton and Chervany (1981); Magal and Carr (1988); Magal et al. (1988); Miller and Doyle (1987); Munro and Wheeler (1980); Raghunathan et al. (1989); Rockart (1979, 1982); Zahedi (1987); Prakash (1996); Laudon and Laudon (1997)
Facilitate communication and sharing of information among the employees	Prakash (1996); Laudon and Laudon (1997); Hills (1997), Grohowski et al. (1990); Rowley and Smiley (1991)
Provide adequate control for IS/e-commerce system implementation and plan for maintenance and its costs	Hills (1997), Dagenais (1991); Bailey and Pearson (1983), Grohowski et al. (1990) Raghunathan et al (1989)
Provide effective management of IS/e-commerce resources	Bailey and Pearson (1983); Bikson and Gutek (1984), Griffith (1993); Dagenais (1991); Grohowski et al. (1990); Ferguson and Dickinson (1982); Ives and Olson (1984); Magal and Carr (1988), Magal et al. (1988); Martin (1982); Miller and Doyle (1987), Raghunathan et al. (1989); Rockart (1979, 1982), Tait and Vessey (1988); Zahedi (1987)
Provide reliable and qualified IS/e-commerce services	Banerjee and Golhar (1994); Hamilton and Chervany (1981); Magal and Carr (1988); Magal et al. (1988); Miller and Doyle (1987); Rivard and Huff (1984, 1988); Rockart (1979, 1982); Rowley and Smiley (1991); Yaverbaum (1988); Zahedi (1987), Zmud (1979)
Provide useful services, enabling tools and education (training)	Mougayar (1997); (Prakash (1996); Laudon and Laudon (1997); Magal and Carr (1988)

Section 6: Internet/E-Commerce Integration with Existing Business Functions	
Integrate IS/e-commerce technologies with ongoing (existing) business processes (eg from marketing to customer service)	Mougayar (1997); Keen and Ballance (1997); Vargo and Hunt (1996); Kalakota and Whinston (1996, 1997), Keen and Ballance, 1997); Carayannis (1997); Levitt (1995); Swatman and Swatman (1991); Bergeron and Raymond (1992b); Sanders (1992); Venkatraman and Zaheer (1990); Zaheer and Venkatraman (1994); Mackay (1992); Davenport (1993); Bloch et al. (1996); Walker (1997)
Integration of e-commerce functions internally (eg. inventory management, order processing, financials, payment processing, shipment, customer support)	Kalakota and Whinston (1996); Kekre and Mukhopadhay (1992), Venkatraman (1990); Rockart and Short (1989); Keen and Balance (1997); Mougayar (1997); Sanders (1992), Mackay (1992); Zaheer and Venkatraman (1994); Swatman and Swatman (1991); Levitt (1995); Bergeron and Raymond (1992); Swatman et al. (1994); Iacovou et al. (1995); Kosiur (1997); Copeland and Hwang (1997)
Integration of IS/e-commerce functions externally (eg. trading partners, customers, clients, suppliers, distributors)	Li (1997); Keen and Ballance (1997); Vargo and Hunt (1996), Zaheer and Venkatraman (1994), Keen and Balance (1997), Carayannis (1997); Bergeron et al. (1991); Bailey and Pearson (1983); Venkatraman and Zaheer (1990); Zaheer and Venkatraman (1994); Mougayar (1997); Swatman and Swatman (1991); Bergeron and Raymond (1992b); Bergeron et al (1991); Bergeron and Raymond (1992); Swatman et al. (1994), and Iacovou et al. (1995)
Integrate activities within the firm's value chains	Cronin (1996); Kalakota and Whinston (1996, 1997), Mougayar (1997); Keen and Ballance (1997); Vargo and Hunt (1996), Zaheer and Venkatraman (1994); Bergeron et al. (1991), Zaheer and Venkatraman (1994); Kekre and Mukhopadhay (1992), Swatman and Swatman (1991); Rockart and Short (1989); Mackay (1992), Davenport (1993); Bloch et al. (1996); Walker (1997); Keen and Ballance (1997); Carayannis (1997)
Implement strategic applications (such as e-commerce) with an outward orientation	Mackay (1992), Bergeron et al. (1991), Bergeron and Raymond (1992b); Bailey and Pearson (1983); Zaheer and Venkatraman (1994); Swatman and Swatman (1991); Mougayar (1997)
Seamless integration of all supply chain processes and measurements	Keen and Ballance (1997); Vargo and Hunt (1996); Kalakota and Whinston (1996); Rockart and Short (1989); Mougayar (1997), Kekre and Mukhopadhay (1992); Venkatraman (1990); Sanders (1992)
Ability to process real-time payments	Neuman and Medvinsky (1997),
Section 7: Organisational Effectiveness for IS/E-Commerce Implementation	
Presence of a dedicated organisational structure	Levitt (1995); Banerjee and Golhar (1994); Klein (1992), Champy (1995); Grohowski et al. (1990); Montazami (1988)
Attainment of organisational objectives and strategy	Kalakota and Whinston (1996, 1997); Guptill (1997), Bloch et al (1996); Mougayar (1997); Bailey and Pearson (1983); Norton and Smith (1998); Martin (1984); Bergeron et al. (1993); Dagenais (1991); Hamilton and Chervany (1981); Munro and Wheeler (1980); Griffith and Northcraft (1993); Cooper and Zmud (1990), Goodman and Griffith (1991)
Improvement in organisational effectiveness	Prakash (1996); Kalakota and Whinston (1996, 1997); Mougayar (1997); Guptill (1997), Bergeron et al. (1993); Ferguson and Dickinson (1982); Raghunathan et al. (1989); Grohowski et al (1990); Griffith and Northcraft (1993); Cooper and Zmud (1990), Goodman and Griffith (1991); Rowley and Smiley (1991)

Increase in the quality of decision-making	Mougayar (1997); Bailey and Pearson (1983); Bloch et al. (1996); Bergeron et al. (1993); Ferguson and Dickinson (1982)
Improvement in organisational performance	Guptill (1997); Bailey and Pearson (1983); Bergeron et al. (1993); Ferguson and Dickinson (1982); Martin (1984); Munro and Wheeler (1980); Raymond (1985)
Improvement in the decision-making quality	Mougayar (1997); Lyytinen and Hirschheim (1987); Bergeron et al. (1993); Raghunathan et al. (1989); Munro and Wheeler (1980); Zmud (1979)
Adequate organisational commitment and effectiveness	Bloch et al. (1996); Cockburn and Wilson (1996); Cronin et al. (1994); Quelch and Klein (1996); Dahl and Lesnick (1996); Ward and Griffiths (1997)
Provide clearly defined online business plan	Mougayar (1997); Kalakota and Whinston (1996, 1997); Cronin (1994, 1996)
Section 8: Change Management for IS/E-Commerce System Implementation	
Recognise needs for managing change	Laudon and Laudon (1997); Harrington and Reed (1996); Kalakota and Whinston (1996, 1997); Kosiur (1997), Brandel (1996); Grover et al. (1995); Ferguson and Dickinson (1982); Ives and Olson (1984); Martin (1982), Zahedi (1987); Norton and Smith (1998); Zander (1962); Leavit and Whisler (1985), Bostrom and Heinen (1977); Armenakis et al. (1994)
Sufficient anticipation and planning for organisational resistance to change	McLeod and Smith (1996); Whitman et al. (1996); Laudon and Laudon (1997); Zander (1962); Romney (1996), Grover et al (1995), Hammer and Champy (1993); White and Manning (1998); Norton and Smith (1998); Zander (1962); Szlichinski (1983), Armenakis et al. (1994); Krovi (1993); Moreton (1995), Joshi (1991); Romney (1996); Hall et al. (1993); Stoddard and Jarvenpaa (1995); Grint et al. (1996); Grover et al. (1995)
Provide appropriate employee compensation incentives in the new process	Laudon and Laudon (1997); Romney (1994), Hall et al (1993), Krovi (1993); Hammer and Champy (1993), Markus and Benjamin (1997)
Consider existing organisational culture	Katz and Aspden (1997); Ramsoomair (1997); Spar and Bussgang (1997); Whitman et al. (1996); Laudon and Laudon (1997), Child et al. (1987); Grint et al (1996), Hall et al (1993), Burnes (1996), Dawson (1996); Szlichinski (1983); Turban et al (1996); Elliot (1990); Moreton (1995); Burnes (1996); Dawson (1996)
Gain cross-functional cooperation for organisational change	Romney (1996), Grover et al (1995), Stoddard and Jarvenpaa (1995), Whitman et al. (1996); Laudon and Laudon (1997), Harrington and Reed (1996); Kalakota and Whinston (1996, 1997); Kosiur (1997); Brandel (1996); Harrington and Reed (1996)
Provide necessary changes in the human resource policies for implementation	Whitman et al. (1996); Hall et al (1993), Hammer and Champy (1993); Laudon and Laudon (1997), Romney (1994), Zander (1962); Armenakis et al. (1994); Markus (1983); Moreton (1995); Hall et al. (1993); Markus and Benjamin (1997)
Adequate training for staff affected by the new system	Whitman et al. (1996); Turban et al. (1996); Laudon and Laudon (1997); Levitt (1995); Banerjee and Golhar (1994), Grover et al (1995); Hammer and Champy (1993); Krovi (1993); Romney (1994), Hall et al. (1993), White and Manning (1998); Norton and Smith (1998); Armenakis et al. (1994); Ginzberg (1981); Stoddard and Jarvenpaa (1995); Grint et al. (1996)
Consider the politics of the system implementation efforts	Stoddard and Jarvenpaa (1995), Hammer and Champy (1993), Romney (1994); Hall et al. (1993)
Communicate reasons for change to members of the organisation	Laudon and Laudon (1997); Grover et al. (1995), Turban et al. (1996); Grint et al. (1996); Whitman et al. (1996); Hall et al. (1993), Norton and Smith (1998); Stoddard and Jarvenpaa (1995), Zander (1962); Zmud and Cox (1979); Stoddard and Jarvenpaa (1995), Grint et al. (1996)

Set reasonable expectations attributed to implementation as a solution for all organisational problems	Li (1997); Levitt (1995); Laudon and Laudon (1997); White and Manning (1998); Bailey and Pearson (1983); Stoddard and Jarvenpaa (1995); Romney (1994); Grint et al (1996), Hall et al (1993), Norton and Smith (1998);Grohowski et al. (1990); Zander (1962); Krovi (1993); Harrington and Reed (1996); Kalakota and Whinston (1996, 1997); Kosiur (1997); Brandel (1996)
Organisation's ability to structural transformation for the new system	Kosiur (1997); Kalakota and Whinston (1996, 1997); Hills (1997)
Section 9: IS/Internet/E-Commerce System Security and Reliability	
Provide secure and reliable Internet/e-commerce system (eg. from network infrastructure to payment systems)	Cronin (1996); Collin (1997); Hawryszkiewycz (1997); Aldridge et al. (1997); Kalakota and Whinston (1996, 1997); Kalakota (1997); Verity (1995); Bernstein et al. (1996); Bloch et al. (1996); Keating (1996); Cockburn and Wilson (1996); Hinrichs (1997); Forcht et al. (1997); Solms (1997); Wilson (1997), Lichtenstein and Swatman (1997); Chester and Kaura (1998); Laudon and Laudon (1997); Ahuja (1997); Jenkins (1997); Dahl and Leslie (1996)
Provide adequate control procedures for EDI/e-commerce system	Mathieu and Woodard (1996); Whitman et al. (1996); Li (1997); Sokol (1989, 1995); Smith (1996); Small (1996); Ford and Baum (1997); Wilson (1997); Froomkin (1997); Soh et al (1997), Abell and Lim (1996); Lymer et al. (1996); Sieber (1996a, 1996b); Stipe (1996); Minahan (1997); Bernstein et al (1996); Jenkins (1997)
Ensuring network security and reliability, availability, data and database security, data integrity, access security, system security, transaction security, and application security	Mougayar (1997); Laudon and Laudon (1997); Bernstein et al (1996); Mathieu and Woodard (1996); Davis and Olson (1985); Smith (1996); Small (1996); Ford and Baum (1997); Wilson (1997); Froomkin (1997); Liddy (1996); Doddrell (1995, 1996), Sanderson and Forcht (1996); Forcht and Wex (1996); Friedman (1996); Goldschlag et al. (1997); Ahuja (1997); Neuman and Medvinsky (1997); Prakash (1996); Nejmeh (1994); Press (1994), Loeb (1998); Harrington (1995), Arnum (1995); Pattison (1997)
Have a clearly stated IS/ Internet security policy and standards	Adolphson and Hansen (1991); Hills (1997); Smith (1996), Small (1996); Ford and Baum (1997); Wilson (1997), Froomkin (1997); Liddy (1996); Doddrell (1995, 1996); Sanderson and Forcht (1996); Forcht and Wex (1996); Friedman (1996); Bernstein et al. (1996); Goldschlag et al. (1997), Ahuja (1997), Neuman and Medvinsky (1997); Soh et al. (1997); Prakash (1996); Nejmeh (1994); Press (1994); Loeb (1998); Harrington (1995); Laudon and Laudon (1997)
Provide secure electronic payments infrastructure and delivery mechanism	Neuman and Medvinsky (1997); Kalakota and Whinston (1996, 1997); Mougayar (1997); Verity (1995), Russell (1995); Forcht and Fore (1995); Keating (1996); Bernstein et al. (1996), Cronin (1996); Kalakota (1997); Aldridge (1997); Ahuja (1997)
Provide and ensure e-commerce system reliability (from network to payment)	Hayashi (1996); Kalakota (1997); Aldridge et al. (1997); Segev et al. 1995)
Determine security needs and implement security	Bernstein et al. (1996); Hills (1997); Laudon and Laudon (1997), Sokol (1989, 1995); Mathieu and Woodard (1996), Smith (1996); Small (1996); Ford and Baum (1997); Wilson (1997); Froomkin (1997); Liddy (1996); Doddrell (1995, 1996); Sanderson and Forcht (1996); Forcht and Wex (1996); Friedman (1996); Goldschlag et al. (1997); Ahuja (1997); Neuman and Medvinsky (1997); Nejmeh (1994); Prakash (1996); Press (1994); Loeb (1998); Harrington (1995)

Determine and develop security infrastructure needs	Hills (1997); Laudon and Laudon (1997); Sokol (1989, 1995); Mathieu and Woodard (1996); Davis and Olson (1985); Martin (1982); Raghunathan et al. (1989); Smith (1996); Small (1996); Ford and Baum (1997); Wilson (1997); Froomkin (1997); Liddy (1996); Doddrell (1995, 1996); Sanderson and Forcht (1996); Forcht and Wex (1996); Friedman (1996); Bernstein et al. (1996); Goldschlag et al. (1997); Ahuja (1997); Neuman and Medvinsky (1997); Soh et al. (1997); Prakash (1996); Nejmeh (1994), Press (1994); Loeb (1998); Arnum (1995); Pattison (1997)
Evaluate and select an reliable Internet Service Provider (ISP) and Web server	Mathieu and Woodard (1996); Hills (1997); Smith (1996); Small (1996); Ford and Baum (1997); Wilson (1997); Froomkin (1997), Liddy (1996); Doddrell (1995, 1996); Sanderson and Forcht (1996); Forcht and Wex (1996); Friedman (1996); Bernstein et al. (1996); Goldschlag et al. (1997); Ahuja (1997); Neuman and Medvinsky (1997); Soh et al. (1997) Loeb, (1998), Arnum (1995); Pattison (1997)
Provide data privacy and integrity	Hawryszkiewycz (1997); Segev et al. 1995); Spar and Busgang (1996); McCartney (1997); Stores (1996); Matsumoto (1995); Aldridge et al. (1997)
Provide data transaction security and integrity	Ahuja (1997); Schneier (1998); Cockburn and Wilson (1996); Fairchild (1996)
Provide Internet security policy and training for internal users and customers	Hinrichs (1997); Dhillon (1997); Russell (1995); Ahuja (1997); Arnum (1995); Pattison (1997); Bernstein et al. (1996)
Provide risk free network and transaction security	Forcht and Wex (1996); Lindy (1996); Zwass (1996); Wilson (1997); Forcht et al. (1997); Clarke (1997a); Bernstein et al (1996)
Provide user privacy and confidentiality	McKnight and Bailey (1997); Hawryszkiewycz (1997), Spar and Busgang (1996); McCartney (1997); Stores (1996); Matsumoto (1995); Aldridge et al. (1997); Martin (1982), Raghunathan et al. (1989)
Section 10: Technological Competence for IS/E-Commerce Implementation	
Adequate IS/E-commerce application infrastructure (eg. reliable telecommunications network)	Prakash (1996); Bhatnagar (1990), Lu et al (1988), Bailey and Pearson (1983); Broadbent and Weill (1995)
Sufficient understanding about existing data, applications and IS/E-commerce across the organisation	Martinez (1995), Grover et al. (1995), Li (1997); Bhatnagar (1990), Lu et al. (1988); King, et al. (1989); Montazami (1988)
Sufficient database infrastructure	Bhatnagar (1990); Prakash (1996); Lu et al (1988); Grover et al (1995); Broadbent and Weill (1995), Lucas (1975)
Aggressively using IS/E-commerce enablers	Hammer (1990); Bailey and Pearson (1983); Taylor (1996)
Satisfactory to continually assess emerging IT/IS capabilities	Grover et al. (1995); Li (1997); Bailey and Pearson (1983); Bhatnagar (1990); Lu et al. (1988); Lucas (1975)
Expertise in IT/IS/E-commerce within the organisation	Li (1997); Prakash (1996); Martinez (1995), Bhatnagar (1990); Miller and Doyle (1987); Bailey and Pearson (1983); Lu et al (1988); King et al. (1989); Abdul-Gader (1990); Montazami (1988); Lucas (1975)
Adequate user and management computer and Internet technologies knowledge	Prakash (1996); Mougayar (1997); Abdul-Gader (1990); Montazami (1988)

Level of technological readiness and access to technical competence (eg. hardware, software, and human resources components, etc)	Grover et al. (1995); Nord and Tucker (1987); Tornatzky and Klein (1982)
Evaluate organisational and technical factors (eg. skills of personnel, internal training, work procedures, process flexibility, etc)	Grover et al. (1995); Tornatzky and Klein (1982)
Ability of the organisation to activate and coordinate its technological resources	Nord and Tucker (1987)
Know what technology to use, how to use it, and how to judge its effectiveness in using it.	Nord and Tucker (1987); Grover et al. (1995)
Able to identify the state of the IT/E-commerce infrastructure	Hammer (1990); Taylor (1996); Tornatzky and Klein (1982)
Level of information technology knowledge, experience and expertise	(Martinez 1995) Grover et al. (1995). Tornatzky and Klein (1982)
Ability of the organisation to activate and coordinate its human resources.	Nord and Tucker (1987); Tornatzky and Klein (1982)
Able to activate the employees in appropriate ways, to motivate performance	Nord and Tucker (1987); Tornatzky and Klein (1982)
Technical people's ability to recognise what the requirements would be for the of E-commerce system.	Broadbent and Weill (1995); Tornatzky and Klein (1982)
Section 11: IS/E-Commerce System Applications	
Section 11.1: Quality of Application	
Quality of IS/e-commerce information output	Li (1997); McLeod and Smith (1996). DeSanctis and Courtney (1983); Bailey and Pearson (1983); Bergeron et al (1993); Hamilton and Chervany (1981); Ives and Olson (1984)
Quality of user IS/e-commerce database and Web applications	McLeod and Smith (1996); DeSanctis and Courtney (1983); Bergeron et al (1993); Hamilton and Chervany (1981).
Reliability of IS/e-commerce system applications	Li (1997); Ives et al. (1983); DeSanctis and Courtney (1983). Bailey and Pearson (1983); Miller and Doyle (1987). Bergeron et al. (1993); Dagenais (1991); Ives and Olson (1984). Magal and Carr (1988); Magal et al. (1988); Raghunathan et al. (1989); Tait and Vessey (1988)
Quality of selected and installed IS/e-commerce hardware and software	Hills (1997); Magal et al (1988)
Keep e-commerce Web applications fresh and new-ways	Hills (1997)

Select right IS/e-commerce software solution for the intended business operations	Hills (1997); Fosdick (1992)
Section 11.2: Efficiency of Application	
Cost-effectiveness of IS/e-commerce applications and systems	Li (1997); Bergeron et al. (1993); Ives et al. (1983); Bailey and Pearson (1983); Dagenais (1991), Hamilton and Chervany (1981), Ives and Olson (1984); Magal and Carr (1988); Magal et al (1988), Miller and Doyle (1987); Raghunathan et al (1989), Grohowski et al. (1990), Swanson (1974)
Reduce data processing and maintenance cycle	Bergeron et al. (1993); Li (1997);
Provide value-added services (for example, educating and training customers with more information)	Cronin (1996); Mougayar (1997); Neuman and Medvinsky (1997); Ellsworth and Ellsworth (1994, 1996); Dahl and Lesnick (1996)
Provide efficient e-commerce payment system	Neuman and Medvinsky (1997); Dahl and Lesnick (1996), Ellsworth and Ellsworth (1994, 1996)
Reduction in users' working effort	Li (1997); Bailey and Pearson (1983); Bergeron et al (1993), Raghunathan et al (1989)
Section 11.3: Flexibility and Adequacy of Application	
Provide flexible and user friendly (ease-of-use) e-commerce system	Smith (1998), Neuman and Medvinsky (1997); O'Mahony et al., (1997)
Make to user-friendly by getting users involved in testing.	Bailey and Pearson (1983), Zmud (1979); Li (1997)
Evaluate application's flexibility for e-commerce system implementation	Hills (1997); Kalakota and Whinston (1997)
Provide flexible, convertible and widely accepted e-commerce payment system (i.e. support several payment methods, credit cards, personnel checks, cashier's checks, and even anonymous electronic cash)	Neuman and Medvinsky (1997); Dahl and Lesnick (1996); Lynch and Lundquist (1996); Ellsworth and Ellsworth (1994, 1996)
Provide adequate and appropriate IS/e-commerce system application	Li (1997; Ellsworth and Ellsworth (1994, 1996), Mougayar (1997); Bailey and Pearson (1983); Dagenais (1991), Ehrenreich (1992);
Balance between local autonomy of applications and their integration to organisational systems	Bergeron et al (1993), Li (1997)
Strategic and Competitive advantage of IS/e-commerce software applications	Cronin (1996, 1996); Li (1997); Ellsworth and Ellsworth (1994, 1996); Mougayar (1997); Bergeron et al (1993); Bailey and Pearson (1983); Rockart (1979, 1982)
Applications respond to internal and external users' needs	Li (1997); Ellsworth and Ellsworth (1994, 1996); Mougayar (1997); Bergeron et al (1993), Bailey and Pearson (1983), Miller and Doyle (1987); Munro and Wheeler (1980)

APPENDIX B

A SAMPLE OF FINAL QUESTIONNAIRE

SURVEY ON INTERNET-BASED E-COMMERCE IMPLEMENTATION IN BUSINESS OPERATIONS

SECTION 1:

Please choose (tick or circle) the answer that best describes the characteristics of your company.

1. How long have your company been connected to the Internet?
   <1year 1-2years 2-3years 3-4years >4years

2. How long have your company been operating a Web site on the Internet?
   <1year 1-2years 2-3years 3-4years >4years

3. How long have your company been commenced to use Internet-based e-commerce in business operations?
   <1 year 1-2 years 2-3 years 3-4 years >4 years

4. Currently what percentages of your company's overall business operations are conducted on Internet-based e-commerce system?
   0-20% 21-40% 41-60% 61-80% 81-100%

5. Currently, to what degree does your company has implemented Internet-based e-commerce?
   Very Basic Level (eg. static Web pages)
   Basic Level (eg. dynamic Web pages/ searchable site)
   Middle Level (eg. Integration with operational databases, package tracking, job postings)
   Advance Level (eg. customer transactions through the Internet, selling products and services, buy and sell stocks, apply for loans, etc.)
   Full E-Commerce Level (eg. a Web site that address all aspects of a business transaction -marketing, purchasing, distribution, payment, settlement, etc.)
   Next Generation Enterprise Level (eg. Web is used to conduct virtually all business internal, customer and supplier, business partners even competitors).
   Not applicable or if other please specify _____.

6. What specific business functions is the majority of your company using e-commerce to support?
   Sales/Marketing/business development
   Electronic payment/ settlement
   Logistics
   Internal applications
   Purchasing/ order processing
   Customer service/communications
   Resource Management
   Other, please specify _____.

7. How would you rate your company's overall business operations satisfaction with Internet-based e-commerce system implementation in your business?
   Very Dissatisfied Dissatisfied Neutral (Uncertain)
   Satisfied Very Satisfied Extremely Satisfied

Could you please indicate your opinion about the following statements in *Sections 2 and 3*, using the given scales, (1) strongly disagree and (7) strongly agree. Please circle the appropriate scale of the corresponding items.

(SD) Strongly Disagree 1	(MD) Moderately Disagree 2	(D) Disagree 3	(U) Uncertain 4	(A) Agree 5	(MA) Moderately Agree 6	(SA) Strongly Agree 7

SECTION 2:

Please choose the score that best describes the improvements in your company's business operations performance with the Internet-based e-commerce system implementation.

	ITEMS	SD	MD	D	U	A	MA	SA
1.	Improved system availability, flexibility and usefulness	1	2	3	4	5	6	7
2.	Simplified and streamlined business processes	1	2	3	4	5	6	7
3.	Improved speed of product/service cycle (eg. delivery speed, lead time and purchasing cycle)	1	2	3	4	5	6	7
4.	Improvements in product/service and information quality	1	2	3	4	5	6	7
5.	Time savings in business operations and management (eg. improved speed and reduced order process cycle and transaction times)	1	2	3	4	5	6	7
6.	Cost savings in business operations and management (eg. from reduced inventories, communication, order process, access to real time data)	1	2	3	4	5	6	7
7.	Improved overall productivity and efficiency of the users (through reduced operations and process cycle/shortened cycle time)	1	2	3	4	5	6	7
8.	Improved internal/external communications and relationships between users (employees, customers, suppliers) and management	1	2	3	4	5	6	7
9.	Higher user/customer satisfaction (through better information/ service quality and timely response)	1	2	3	4	5	6	7
10.	Increased sales, revenues and market share (through access to new and wider local/global markets)	1	2	3	4	5	6	7
11.	Enhanced competitive advantage (faster and cheaper development of new products/service)	1	2	3	4	5	6	7
12.	Improving effective decision making and empowerment of users (increased job satisfaction)	1	2	3	4	5	6	7

SECTION 3:

Please choose the score that best describes your agreement with the following statements on the importance of activities for Internet-based e-commerce implementation success of your company.

	ITEMS	SD	MD	D	U	A	MA	SD
1.	Top management's sufficient understanding about the goals for e-commerce system implementation	1	2	3	4	5	6	7
2.	Promote acceptance of the e-commerce implementation concept to the whole firm	1	2	3	4	5	6	7
3.	Promote support of top management for the e-commerce implementation concept	1	2	3	4	5	6	7
4.	Design a strategic e-commerce system implementation planning	1	2	3	4	5	6	7
5.	Promote users' commitment and support for the e-commerce system implementation concept	1	2	3	4	5	6	7
6.	Top management involvement in the e-commerce implementation efforts and processes	1	2	3	4	5	6	7
7.	Successful management leadership for implementation efforts	1	2	3	4	5	6	7
8.	Commitment and support of management to the e-commerce implementation concept	1	2	3	4	5	6	7
9.	Communicate with users about e-commerce procedures and services	1	2	3	4	5	6	7
10.	Provide effective communication and data sharing among organisational units	1	2	3	4	5	6	7
11.	Provide coordination through communication of corporate or business departments	1	2	3	4	5	6	7
12.	Communicate with e-commerce users	1	2	3	4	5	6	7
13.	Provide training to e-commerce staff and users	1	2	3	4	5	6	7
14.	Respond to user's request for e-commerce system support	1	2	3	4	5	6	7
15.	Provide routine communication and data sharing among organisational units	1	2	3	4	5	6	7
16.	Providing reliable and consistent communication and facilitations to all relevant units	1	2	3	4	5	6	7
17.	Improve users' confidence in the e-commerce system	1	2	3	4	5	6	7
18.	Improve access (easier and quicker) to the e-commerce system	1	2	3	4	5	6	7
19.	Improve user productivity by realisation of user requirements	1	2	3	4	5	6	7
20.	Permit control over e-commerce services by users	1	2	3	4	5	6	7
21.	Generate user satisfaction with the implemented e-commerce system	1	2	3	4	5	6	7
22.	Increase the use of implemented e-commerce systems	1	2	3	4	5	6	7

23.	Satisfy user's expectations of the e-commerce system	1	2	3	4	5	6	7
24.	Ease the use of e-commerce system tools for users	1	2	3	4	5	6	7
25.	Provide users' positives attitudes toward e-commerce system implementation	1	2	3	4	5	6	7
26.	Provide users' understanding of the implemented e-commerce system	1	2	3	4	5	6	7
27.	Provide users' participation in the e-commerce system implementation	1	2	3	4	5	6	7
28.	Involve users in e-commerce system implementation	1	2	3	4	5	6	7
29.	Provide competent e-commerce staff	1	2	3	4	5	6	7
30.	Develop and provide a basis for control of e-commerce system guidelines, standards and policies, etc.	1	2	3	4	5	6	7
31.	Manage e-commerce resources effectively and efficiently	1	2	3	4	5	6	7
32.	Provide reliable and qualified e-commerce services, enabling tools and education (training)	1	2	3	4	5	6	7
33.	Facilitate an increase in the productivity of users and their business processes.	1	2	3	4	5	6	7
34.	Provide adequate control for e-commerce system implementation and plan for maintenance and its costs	1	2	3	4	5	6	7
35..	Providing the organisational units with information for 24 hours a day and seven days a week	1	2	3	4	5	6	7
36.	Provide e-commerce system integration with ongoing (existing) business processes	1	2	3	4	5	6	7
37.	Provide seamless integration of all supply chain processes and measurements	1	2	3	4	5	6	7
38.	Integrate e-commerce system with all internal operation functions (eg. order processing)	1	2	3	4	5	6	7
39.	Integrate e-commerce system with all external operation functions (eg. customers, suppliers)	1	2	3	4	5	6	7
40.	Enhance firm's value-chain integration with e-commerce system	1	2	3	4	5	6	7
41.	Provide a high degree of e-commerce integration and consistency across the infrastructure, networks, databases and overall business processes	1	2	3	4	5	6	7
42.	Organisational acceptance of e-commerce concept	1	2	3	4	5	6	7
43.	Attain organisational objectives and strategy for e-commerce system implementation	1	2	3	4	5	6	7
44.	Provide clearly defined on-line business plan							
45.	Improve organisational effectiveness And performance	1	2	3	4	5	6	7
46.	Increase the quality of decision making	1	2	3	4	5	6	7
47.	Improve general organisational effectiveness	1	2	3	4	5	6	7
48.	Presence of a dedicated organisational structure	1	2	3	4	5	6	7
49.	Adequate organisational commitment and effectiveness	1	2	3	4	5	6	7
50.	Recognise needs for managing change	1	2	3	4	5	6	7

51.	Sufficient anticipation and planning for organisational resistance to change	1	2	3	4	5	6	7
52.	Gain cross-functional cooperation for organisational change	1	2	3	4	5	6	7
53.	Provide necessary changes in the human resource policies for implementation	1	2	3	4	5	6	7
54.	Communicate reasons for change to members of the organisation	1	2	3	4	5	6	7
55.	Provide appropriate employee compensation incentives and training in the new process	1	2	3	4	5	6	7
56.	Set reasonable expectations attributed to implementation as a solution for all organisational problems	1	2	3	4	5	6	7
57.	Organisation's ability to cultural and structural transformation for the new system	1	2	3	4	5	6	7
58.	Facilitate the management of change	1	2	3	4	5	6	7
59.	Determine, implement and control overall Internet/e-commerce system security needs	1	2	3	4	5	6	7
60.	Provide clearly stated Internet security policy, standards and adequate user training on the security issues	1	2	3	4	5	6	7
61.	Provide secure electronic payments infrastructure and convenient delivery mechanism	1	2	3	4	5	6	7
62.	Provide and ensure adequate user privacy and confidentiality	1	2	3	4	5	6	7
63.	Provide overall e-commerce system network and data transaction security; data and database integrity	1	2	3	4	5	6	7
64.	Provide and ensure overall e-commerce system reliability	1	2	3	4	5	6	7
65.	Provide a reliable Internet Service Provider (ISP) and Web server to access quickly and securely.	1	2	3	4	5	6	7
66.	Provide quick system access availability and reliable information on time	1	2	3	4	5	6	7
67.	Provide secure and reliable Internet/e-commerce system	1	2	3	4	5	6	7
68.	Adequate e-commerce application infrastructure (eg. reliable telecommunications network)	1	2	3	4	5	6	7
69.	Sufficient understanding about existing data, applications and e-commerce across the organisation	1	2	3	4	5	6	7
70.	Satisfactory to continually assess emerging Internet/e-commerce capabilities	1	2	3	4	5	6	7
71.	Level of Internet/e-commerce system knowledge, experience and expertise	1	2	3	4	5	6	7
72.	Adequacy of e-commerce-related knowledge and skills of user and managers throughout the organisation	1	2	3	4	5	6	7
73.	Level of technological readiness and access to technical competence (eg. hardware, software, and human resources components, etc)	1	2	3	4	5	6	7

74.	Ability of the organisation to identify, activate and coordinate its technological and human resources	1	2	3	4	5	6	7
75.	Provide high quality real-time Web-based e-commerce information and data output	1	2	3	4	5	6	7
76.	Provide high quality e-commerce databases and Web applications	1	2	3	4	5	6	7
77.	Select and install quality hardware and the right e-commerce software solution for the intended business operations	1	2	3	4	5	6	7
78.	Promote high quality applications for the implemented e-commerce	1	2	3	4	5	6	7
79.	Provide up-to-date information content on Web site as part of e-commerce value-added services	1	2	3	4	5	6	7
80.	Reduce the business processing; data and maintenance cycle	1	2	3	4	5	6	7
81.	Provide efficient data transaction; convenient and widely accepted e-commerce payment system	1	2	3	4	5	6	7
82.	Improve the efficiency of e-commerce system applications for users	1	2	3	4	5	6	7
83.	Provide flexible and user friendly (ease-of-use) e-commerce system applications	1	2	3	4	5	6	7
84.	Provide availability and easy access to e-commerce system for 24 hours a day 7 days a week	1	2	3	4	5	6	7
85.	Promote applications that make e-commerce system business process easier	1	2	3	4	5	6	7
86.	Promote e-commerce system applications that provide competitive edge for the firm	1	2	3	4	5	6	7
87.	Provide flexible and convenient data transaction and payment methods	1	2	3	4	5	6	7
88.	Provide and promote flexible, adequate, and appropriate applications for e-commerce system implementation	1	2	3	4	5	6	7

SECTION 4:

Please choose the answer that best describes the characteristics of your company and your positions.

1. What is your organisation's primary type of business?

Manufacturing	Trade (Wholesale/Retail)	Housing/Real estate
Engineering/Architecture	Transport/Utility	Service
IT/Computing	Health-care/Medical	Government
Travel/Tourism	Finance/Banking/Insurance	Publishing

Other (please specify)_____

2. How many employees (including part-time) work in your company?

<10	11-50	51-100	101-200
201-500	501-1000	1001-5000	>5000

3. What are the approximate annual sales of your company?

<$1,000,000	$1,000,000-$5,000,000
$ 5,000,001-$10,000,000	$10,000,001-$50,000,000
$50,000,001-$100,000,000	$100,000,001-$200,000,000
$200,000,001-$500,000,000	$500,000,001-$1,000,000,000
> $1,000,000,000	

4. Which of the following best describes your position in your company?

CEO	Senior IS/E-Commerce manager
CIO	Middle IS/E-Commerce manager
IS/E-Commerce Director	IS/E-Commerce manager
Other (please specify)_____	

5. Would you like to have a copy of survey results?

   Yes (please provide a return address)_____

   No

6. Please fell free to add any comments you would like?

_____

_____

_____

_____

_____

_____

THANK YOU VERY MUCH FOR YOUR PARTICIPATION OF THIS SURVEY.