Review of Economics of Management Information Systems

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A REVIEW OF MAJOR ASPECTS OF THE ECONOMICS OF INFORMATION TECHNOLOGY
Abstract

“Information technology is the "digital nervous system" of any business.”

(Bill Gates, Chairman, Microsoft Corporation, 1997)

The way business is conducted in this era is phenomenal. Almost everything is a “click” away. The customers are satisfied, businesses are satisfied, Government is satisfied and the entire globe is gratified by the work of information technology (IT). This research discloses the several returns and shortcomings of IT, and how businesses use IT to realize their strategic goals.

The report presents discussion on two organisations, Dell Computer Corporation and Sydney Waters, which had a prosperous and disastrous implementation of IT systems respectively. The project’s success and failure factors were investigated to gain further insight into ways IT projects should be handled. The report further proposes that any IT project should have a business case model, where a revenue model and a return on investment should be outlined clearly for transparency and accountability.
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1.0 Introduction

Information and communications technology (ICT) has emerged as a major driving force of the global economy, the developed and the developing countries. Figure 1 below indicates the accessibility of internet in these countries. The three main sectors for ICT development are telecommunications, media and internet industries. These industries will foster greater information sharing and building of knowledge. Peter Drucker in his famous book *The Age of Discontinuity* mentioned about “knowledge based economy”. It refers to the use of knowledge technologies, such as knowledge engineering and knowledge management, to produce economic benefits as well as job creation. Organisation for Economic Cooperation and Development (OECD) also recognizes knowledge as the driver of productivity and economic growth. As a result, there is a new focus on the role of information, technology and learning in their economic performance. More than 50% of Gross Domestic Product (GDP) in the major OECD countries is now knowledge based (OECD, 1996). Without knowledge transfer, understanding and usage, gain cannot be realized. The internet and communications infrastructure is a key platform to conduct business, connect people and provide efficient and effective government services.

![Proportion of households with Internet access by level of development, 2002-2010](http://www.itu.int/ict/statistics)

*ITU Statistics (http://www.itu.int/ict/statistics)*

*Figure 1: Proportion of households with Internet access by level of development, 2002-2011*(projected)
Recent article on BookRags website (BookRags, 2011) mentioned on Drucker’s work on “knowledge based worker”. It emphasized that knowledge based workers use their knowledge to get things done in a dynamic environment. They are high level employees who apply theoretical and analytical knowledge, acquired through formal education, to develop new products or services. In this highly digitized world, the combination of knowledge based economy and knowledge based worker has already begun steering the world into an ever increasing economic development and prosperity. Most prominent of this development is in the case of developing economies, such as Fiji. Table 1 below shows the approximate size of internet users in Fiji until 2008 only. The statistics indicate that internet penetration is approximately 9% of the population. Even though this is higher than the GDP growth, but to achieve larger economic growth internet penetration needs to increase. Figure 2 makes this theory clear where China has the second largest ICT penetration and the largest GDP growth today.

Table 1: Internet Usage in Fiji

<table>
<thead>
<tr>
<th>Description</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Population</td>
<td>837,271 (2007 Census)</td>
</tr>
<tr>
<td>Internet users</td>
<td>80,000</td>
</tr>
<tr>
<td>Price Basket for Internet</td>
<td>$22.76 US/ month</td>
</tr>
<tr>
<td>GDP Growth (From Fiji Bureau of Stats)</td>
<td>4%</td>
</tr>
</tbody>
</table>

Source: <http://www.nationmaster.com/red/country/fj-fiji/int-internet&all=1>  
[Accessed 19 December, 2011]

The Fiji Government is aware of new opportunities offered by ICT and has taken a lead role by launching the Information Technology and Development policy directions to encourage,
facilitate and support the development and growth of this industry and its people. Also stated in the policy is the contribution ICT will make to Fiji’s economy through revenue generation, job creation, social inclusion, conservation of culture and administrative and operational efficiencies. In a report by Fiji Islands Bureau of Statistics (2010, p.18) it revealed that transport and communication sector in Fiji, in the year 2005, contributed to approximately 7% of the total employment in all industries. Hotel industry had the highest employment numbers of approximately 30%. A proactive role by the Government intends to raise the above figures such that Fiji is competent in the e-Globe. However, it must be noted that ICT doesn’t only means providing employment in the communications industry. It also means creating jobs in other industries such as manufacturing and education with the use of information systems in manufacturing and service sectors, and greater use of e-learning in the education sector.

Fiji has international telecommunications connectivity through Southern Cross undersea fibre optic cable. The major players in this industry are Fiji International Telecommunications Limited (FiNTEL), Vodafone Fiji Limited and Digicel Fiji Limited. Telecom Fiji Limited was the first leased line providers. Due to deregulation more people now have basic access to voice and data services. In 2010, the International Telecommunications Union (ITU) ranked Fiji 91 out of total of 159 countries in terms of ICT development. On 10th October 2011, a National Broadband policy was launched by the Government of Fiji.

The National Broadband Policy forms a major part of the National Information Technology and Development policy described above. Broadband is the high speed access service that provides connection to the internet and to other information services. The policy addresses both supply and demand sides of broadband issues. The framework sets provision of quality and affordable broadband access in Fiji as well as initiatives that will stimulate demand both from household and business sectors. Probable benefits achieved through the broadband policy would be similar to that achieved through the ICT policy. However, these benefits cannot be achieved in isolation of the global economy.

Information technology has brought the world economy on the same platform where businesses trade freely and demand can be stimulated from any corner of the globe. ITC is everybody’s business and no matter what the culture is, we believe that information
technology has a positive impact on everybody. Figure 2 below shows the list of ten countries with cheapest ICT rates. Note that China is second in this listing, which complements its fastest growing GDP in the world today. This shows that economic prosperity is directly proportional to the ICT industry.

![Top 10 countries with the lowest ICT prices, 2010](http://www.itu.int/ict/statistics)

**ITU Statistics** ([http://www.itu.int/ict/statistics](http://www.itu.int/ict/statistics))

**Figure 2: Top 10 countries with the lowest ICT prices, 2010**

All benefits or costs associated with information technology have to be addressed in terms of global economy and the national economy. This literature review aims to analyze the economics of information and explore strategies used to achieve returns in businesses using information technology.
2.0 Literature Review

This section presents the cost benefit analysis of information technology. Section 2.1 elaborates on the advantages of IT while section 2.2 presents the disadvantages of IT.

2.1 Major benefits of Information Technology

“‘In this new economy, digital networking and communication infrastructures provide a global platform over which people and organizations interact, communicate, collaborate and search for information.’ (Turban et al. 2010, p.4). In an organizational level, this infrastructure is used to achieve business objectives.

Table 2 below derived from Turban et al. (2010, p. 50) portrays the major activities supported by IT and the employees supported. The first column inevitably provides the many advantages of information technology.

<table>
<thead>
<tr>
<th>Activities Supported</th>
<th>People supported</th>
<th>IT system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide routines information for planning, organizing, and controlling operations in functional areas</td>
<td>Managers</td>
<td>Management information systems (MIS)</td>
</tr>
<tr>
<td>Provide logistics information on its supply chain</td>
<td>Suppliers, manufacturers, customers</td>
<td>Collaborative planning, forecasting and replenishment (CPFR), Supply chain management (SPM)</td>
</tr>
<tr>
<td>Increases productivity of office workers, automates flow of electronic documents, produces professional quality documents</td>
<td>Office staff</td>
<td>Computers, Office automation system (OAS), desktop publishing system</td>
</tr>
<tr>
<td>Allows engineers to design and test prototypes.</td>
<td>Engineers, drafts people</td>
<td>Computer aided design (CAD)</td>
</tr>
<tr>
<td>Combines models and data to solve</td>
<td>Managers</td>
<td>Decision support system (DMS)</td>
</tr>
<tr>
<td>Semi-structured problems with extensive user involvement</td>
<td>Provides stored knowledge of experts to non-experts, provides decision recommendations based on built-in expertise, supports the gathering, organizing and use of an organization’s knowledge</td>
<td>Knowledge workers, managers</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Gathers and uses large amount of data for analysis by business analytics and intelligent systems</td>
<td>CEO, managers, knowledge workers</td>
<td>Business intelligence systems (BI)</td>
</tr>
<tr>
<td>Customer relationship management</td>
<td>Customer care officers, sales and marketing team</td>
<td>Customer relationship management (CRM), Marketing information system (MIS)</td>
</tr>
<tr>
<td>Efficient payroll processing, purchase order processing, financial activities, better record keeping and efficient accounting processes</td>
<td>Accountants, human resources, finance staff</td>
<td>MYOB, Pay Global, Workplace</td>
</tr>
<tr>
<td>Provision for electronic markets through internet for organizations such as Amazon.com, Wikipedia, Netflix and availability of social media such as Facebook and Twitter.</td>
<td>Marketing and sales team</td>
<td>Web 2.0 Environments, Web based E-commerce systems, mobile marketing</td>
</tr>
</tbody>
</table>

In a wider context, information technology removes or reduces **duplication of efforts**.

Ulubgenga (2008, p.4) stated that due to ICT deployment in organizations, duplication of efforts has been minimized and hence a rise in productivity. Where stacks of paper are to be analyzed and re-analyzed by different departments, information technology can play a pivotal role.
Reduction of duplication efforts saves time and resources, and also reduces errors. Keeping in mind that duplication usually occurs due to miscommunication, IT has enabled the interaction between employees with no constraints on time, distance and managerial levels.

**Cost savings** is yet another feature of information technology. Sousa & Velvo (2001, p.4) stated that use of IT in supply chain involves a lot of cost savings. An organization can look for cheaper vendors and suppliers to reduce costs. He also explained that online catalogues with search functions enable buyers to compare offers from multiple vendors. This buying center creates operational efficiency, saves time and resources, and cost reduction is realized through efficient decision making. Online ticket sales are one good example of cost savings. Ward & Peppard’s (2002, p.30) research concluded that “Ryanair is one of the world’s most successful ‘low fares’ airlines. To support this strategy, the company has looked to the internet to provide a low-cost distribution channel for its seats. Its online booking facility was launched in 1999, migrating customers away from the more expensive travel agent and call-centre channels. Customers can now search for flights online and book them with a credit or debit card.”

Additionally use of automated systems brings down production costs because probability of error is reduced and tasks are processed faster. Sousa & Velvo (2001, p.4) also stated that IT can enable one employee to perform tasks that were previously carried out by five or more employees. It is used in project and asset management to improve management efficiency, which inevitably brings down overhead costs.

IT has been most profound in bringing **economic prosperity** in any country because it provides the potential to expand and grow. It affects the patterns of production, investment and employment, and changes business activities. According to Bongo (2005, p.1) growth can occur in two ways. Firstly, with the increased use of land, labour, capital and enterprise resource systems, productivity is increased. Additionally, ICT generates millions of jobs within the sector and across the entire economy. Inherently, the individual performance and the firm performance are linked to national performance and gross domestic product (GDP).

Figure 3 below depicts the average performance trends of top 250 ICT firms between 2000 and 2009. Notice the contribution of ICT in ‘revenue’ and ‘employment’ sectors. The poor performance noted in net income is due to the Global Financial Crisis in 2008. However, ICT
kept the ‘employment’ trend rising, portraying that ICT can help economies to face recession as well.

Source: http://dx.doi.org/10.1787/888932326983

**Figure 3: Top 250 ICT firms’ average performance trends, 2000-09**

Bongo (2005, p.1) also stated that economic growth used to be directly proportional to distance travelled. Now, the increasing use of information and communication technology is changing this view. The virtual mobility renders travel less important. Connectivity is now enhanced through use of telepresence systems such teleconferencing, video calling, VoIP applications, and mobile communications.

The reality of today is that no economy can operate in isolation. **Globalization** is yet another advantage of information technology. It has helped to share information and end linguistic barriers across countries. On International Telecommunication Union’s website (http://www.itu.int/aboutitu/strategic_plans/04-07/goals.html, Accessed 18 December 2011) one of their goals is “to promote global connectivity”. The virtual world has also enabled social interaction faster than ever. This is evident in social networking sites such as Facebook. Companies are competing against each other to deliver the latest product in market with a value of differentiation. Advanced, cheaper and faster processing ‘chips’ and greater interaction is enabling companies to stay **innovative**, gain **competitive advantage** and continuously exploit increasing power of IT. Gordon Moore, the co-founder of Intel postulated in his famous law that
data density of integrated circuits (IC) will double approximately every 18 months, while cost remained same. This theory implies that most organizations will perform existing functions at decreasing costs over time and thus become more efficient.

Governments are now also able to provide efficient and improved public services. The Fiji IT Development Policy aims to create an e-Fiji, where government provides most services online, improve productivity and secure IT infrastructure to boost confidence in electronic transactions. In his research Sunarno (2001) stated that data warehouse is now common in public sectors where centralized database of information is accessible to a large number of organizations that previously had separate data sources. With respect to public services, health services will improve enabling healthier citizens. In addition provision of education will improve as e-learning is facilitating virtual classrooms. Figure 4 below shows the level of satisfactory services provided by the Australian e-Government.

![Figure 4: Satisfaction by channel of delivery](http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN023389.pdf)

However, government should make sure that the websites are easy to navigate, people have access to the internet and all required information should be posted on the website.
2.1.1 Business Strategies and Information Technology

Ward & Peppard (2002, p.1) stated that “in industries such as telecommunications, media, entertainment and financial services, where the product is already or is being increasingly digitized, a business largely depends on the effective application of information technology”. The benefits outlined in Section 2.1 can be used in several business strategies, both public and private, to improve business performance using information technology. Business strategy involves leveraging the core competencies of the organisation to achieve business objectives. Few important business strategies are marketing, supply chain management, organization structure, human resource management, and customer relationship management.

A business cannot exist without customers. The idea is simple – treat different customers differently as their needs are different and their value to the company might be different. Information technology plays a vital role in today’s digital economy with respect to customer relationship management (CRM). It uses database (for example Oracle and SQL) to deliver their functions. Database is essentially the software that supports the process and applications, which includes personalized web pages, emails and automated response, chat rooms, live chat and call centers. In Fiji the most common customer service is call centers. The results of CRM are value added services, loyalty programs for premium customers, provides opportunity to build personal relationships, reduced inventory costs, and marketing and branding for the business. Shetty (2011) reported that Wal–Mart stores are the world’s largest public corporation by revenue according to Forbes Global 2000. Walmart.com, a subsidiary of Wal-Mart Stores Incorporation, does a great job to enhance relationships online by providing special offers to those who supply their email address. Shetty (2011) also stated that it is important to make relationship marketing interactive to receive feedback, determine what is working and what is not.

However, it must be noted that Walmart stores is the largest supermarket chain of stores and CRM can be justified there in terms of the customer base and financial return. For small and medium enterprises, we recommend that they go for face-to-face customer
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management initially since people will want to see real faces instead of computer responses. Once business is thriving they look into these options. Another potential problem with CRM is the useful utilization of data. Essentially CRM is just collection of data. Analyzing and putting it to usefulness might incur extra costs that SME’s might not able to handle. We believe that technology alone cannot help the company to succeed. Whether small or large, all requires strategic leaders to steer the company into a brighter future.

Marketing essentially involves creating, communicating and delivering value to customers and managing customer relationships that benefits all stakeholders. Information technology has specially helped marketing in a fast and cost effective manner with globalized shopping experiences. Internet marketing as a business strategy is increasingly gaining importance. The organisation advertises products and services, does public relations, interacts through social media, conducts market research, and uses email marketing and direct sales. Aby (2010, March 17) stated in her blog that “it is important for a business or a person to be seen in this global market medium if he or she wishes to build a strong credibility. This virtual community is getting stronger and stronger everyday as more and more people learn how the information technology works. It has made information dissemination a lot easier. It also made relationships seem to be so near though the parties are located far from each other. It is apparent that whatever niche or target market has, there are people who would belong to it. The quest now lies with finding the hungry market and offering solutions to specific concerns”. Online presence of companies helps to fulfill this quest. On October 2010, Levis launched its online brand advertising and marketing campaign titled “Shape What’s To Come” for young women. The aim was to target online women community who shared interests and passions, regardless of age or location. We believe, however, that internet marketing will only survive if the internet business model keeps on changing with the technology. The traditional marketing model might survive for two years without any change. Additionally, marketers will need to do a very good job convincing people. Else because of so many frauds and scam going around, people might not be convinced, and business model might fail.

Supply chain management (SCM) is an iterative process that evaluates the cost – benefit tradeoffs of operational components, as stated by Happek (2005). It drives down
operational costs and increases efficiency such that competitive advantage is gained. In addition, it enables effective management of supply chain partners including suppliers, distributors and customers. United Parcel Service (UPS) of America is one organisation which intensively uses supply chain management as a business strategy. The objective is achieved by using solutions from SAP (Systems, Applications and Products in Data Processing) partners, involving intelligent use of information technology. Dell Computer Corporation’s strategies of direct sales and build-to-order production have proven successful in minimizing inventory and bringing new products to market quickly, enabling it to increase market share and achieve high returns on investment. The Dell success story is further discussed in Section 3.1. Although SCM helps business grow globally, it must be noted that SCM takes a lot of effort, time and investment to integrate with the supply chain partners and make a success out of it.

The days when human resource managers were doing only administrative work is over. Today Human Resource Management (HRM) is part of business strategies at the organizational level and is constantly striving to achieve business goals, especially in marketing and productive sectors. Most importantly, every employee is now seen as a resource that can help businesses gain competitive advantage. Emergence of e-HRM has evolved HRM into a higher platform that is “covering all possible integration mechanisms and contents between HRM and information technologies aiming at creating value within and across organizations for targeted employees and management”(Bondarausk et al, 2004, p.15). Digicel Group has adopted this strategy to communicate across 33 markets around the globe. The e-HRM system is common to anyone using from anywhere and is used to improve such processes as training, management of staff, sharing of important business ideas, discussion forum and recruitment community, disseminate code of ethics and many other important functions of the business. Additionally, we believe that HRM practice would be useful in any organisation, be it SME or larger corporations like Digicel Group. However, smaller companies can adopt the manual HRM system instead of e-HRM. However, if the employees live in different regions it is best that e-HRM is adopted.

Organizational structure is another business strategy, which if fails can take down the whole corporation with it. Jack Welch of General Electric has always emphasized the importance of organizational structure in achieving business goals. It involves delegating roles
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(by ethical leaders), power and responsibility within an organization. IT has also helped form the new technology-centered organizational structures such as the networked organization and creating a virtual organisation where everyone apparently works in one building. Katsanis and Davidson (2001 p.3) defined that networked organization is where geographically dispersed groups of individuals, groups or organizations come together for a common purpose. Technological advances and the rapid accumulation of knowledge appear to have pushed many organizations beyond the limits of what they consider to be bounded rationality. These organizations can interact and collaborate as though they all were co-located in same office.

Most importantly, it must be noted that an organisation structure strategy will fail without the culture of change. Managers often resist changes which could be detrimental to those networked organisation which rely heavily on information technology and defined processes. Organization culture, organizational structure and organizational change should be integrated to obtain the maximum benefits. Once again the need of a strategic leader prevails.

In a nutshell, it can be seen from the above discussions that IT systems helps achieve business goals and complements business strategies.
2.2 Major costs of Information Technology

Information technology has changed the way the world does business today. Although the benefits of integrating IT in businesses are many, there are also disadvantages to its use. Discussed briefly in this section are major costs of information technology.

The first cost of IT is implementation expense. Henderson (1999) stated that every business must consider startup costs when implementing any type of information technology system. Additional costs such as acquisition costs, hardware, software, user licenses for each employee and their training of the unfamiliar technology has to be considered as well. Henderson (1999) further commented that advanced programs still require formal instruction by an expert, and hence adding to the implementation costs. Moreover, maintenance costs by engaging skilled technicians also present major disadvantage, particularly to those businesses new to IT or the SMEs. To combat these disadvantage organizations can look at longer term strategic plans rather looking at technology as a short term thing. With proper strategies, leaders will plan for its use for the next five years or more. Hence the cost of replacement, retraining and reacquiring can be significantly minimized. This would then give better justice to the use of IT.

Henderson (1999) further explained the problem of job elimination. Inevitably paperwork is processed immediately and financial transactions are performed automatically. In other words, automation has prevailed in the face of information technology. Works previously performed by humans are increasingly taken over by technology/machines. This indeed leads to elimination of jobs. Loyal and unskilled workers may find insecurity with technology replacing them at workplace. In addition, a person who is computer illiterate, even though has competitive knowledge is not able to portray his ideas. Machines and robots are sometimes too complex to use. In the local context, one such incident was with Post Fiji Limited, where 300 staffs were made redundant due to changes in infrastructure. People doing manual work had no more chores after this upgrade. In addition outsourcing is also a trend now. Outsourcing is a cause of unemployment which will occur in those countries that are seeking outside labour.
Outsourcing might occur because there might not be local skilled labour available in the organisation to maintain the IT system.

In argument it can be said that IT increases employment opportunities as well. After all machine is created by humans. Job vacancies such as information systems expert, HRM analysts, database administrators, CAD engineers and automated controllers are jobs created because of IT. Additionally, Government should look into e-education such that training is embedded from childhood and everyone will have an opportunity in the e-future.

A third disadvantage identified by Henderson (1999) is security breach, effectively an ethical dilemma for managers, employees and the general public. Most do it out of greed, some because the company head said so and some do it for fun. This vulnerability is more evident when the system is accessible through internet. Without appropriate measures, unauthorized individuals may access confidential data, with possibility of destroying it or using it for illegal purposes. On 29th March, 2011 British Broadcasting Corporation reported that Australian Prime Ministers Julia Gillards computer was hacked into. Attackers were seeking information on the mining industry. Obviously, even the third world countries aren’t spared when it comes to hacking. Identity theft can also be classed into security breach.

Kristin (2010) commented that identity theft is the fastest growing type of fraud in the United States. In 2008 about 9.9 million Americans were reported victims of identity theft, an increase of 22% from the number of cases in 2007. In addition, the Federal Trade Commission (FTC) estimates that it costs consumers about $50 billion annually on identity costs. Virus threat is yet another disadvantage presented by information technology. Computers attached to internet are more prone to virus attacks and they can end up into destroying ones entire hard disk, causing considerable financial losses and psychological effects.

The security threats mentioned above basically leads to one conclusion – presence of unethical behaviour in our society. Code of ethics should be a must in any organization, communicated and trained effectively to the employees. Consequently, moral behaviour of employees will change and above actions can be reduced. In addition, moral behaviour should start from home such that children know from the beginning the right from wrong.
A major problem of information technology is **devastation**. Dilip (Scribed) stated that nuclear weapons are increasingly becoming more powerful and evermore easy with better communication and transportation advancements. Inevitably this leads to social distress and destruction. During the 2011 earthquake in Japan, one of its nuclear stations lost control and could hardly be fixed because of radiation issues, which consequently had negative effects on the environment. Of course the plant was possible in the first place because of technology.

Additionally, short lives of technical products make “their production, use and disposal ecologically unsound” (Adamson et al., 2004). The report by Adamson et al also stated that by 2005, roughly 150 million personal computers (PCs) and workstations will be disposed in landfills in the US alone. This can be prevented, however, if strategies are planned for longer term. In doing so products wouldn’t have to be disposed so rapidly because they will be used for the length of the strategic plan. Additionally, companies can look into recycling products.

Pornography is yet another form of devastation which has affected many lives, especially that of children, since the advent of internet. There are thousands of pornographic sites on the Internet that can be easily found and can be a detrimental factor in children’s behaviour and actions. Parents can look into blocking those sites using software such as Check Point.

Technology may cause several health issues as well. This includes “obesity/heart problems, eye strain, deafness and muscle issues. Waste from technology such as the used fuel and emissions from factory machines may pollute the environment, disturbing ecosystems and making people sick”. ([http://www.ehow.com/list_6329800_advantages-disadvantages-modern-technology.html](http://www.ehow.com/list_6329800_advantages-disadvantages-modern-technology.html) [Accessed 14 December 2011]).

On the contrary, IT helps government to provide more efficient health services. Ever since the use of National Health cards in Fiji, the record keeping has been made easier and patient information is available from any Divisional hospital or major health centres.

Information technology, as discussed above, can pose several disadvantages. However, management involved, longer term strategies, code of conduct and organizational adaption is required to turn these into delimiting factors.
3.0 Discussion of Case Studies

This section presents analyses of two IT case studies, with an attempt to show scenarios in which implementation of information technology systems can succeed (Section 3.1) or fail (Section 3.2). The cases are attached in Appendix A and Appendix B respectively.

Discussed thoroughly in section 3.2 is a case where information technology failed. A disadvantage of IT projects is that it can create huge financial loss for organizations if not properly managed. As discussed in section 3.2, Sydney Water’s loss amounted to more than $30m dollars because of poor management and technical skills, irresponsible board members and lack of a business plan. A problem with IT is that the costs just keep getting out of hand. Technology becomes obsolete daily and the replacement cost has to be incurred to maintain competitive advantage. All projects should be carefully planned and managed to avoid losses. Section 3.1 and section 4.0 can be used as a guide to implement successful IT projects.
3.1 “Dell Computer Corporation: E-Commerce Business Development “, A Success Story of IT

Kimberling (2006) outlined the key success factors of IT projects. This includes focus on business processes and requirements, evaluating ROI (Return on Investment), post-implementation performance measurement, strong project management and resource commitment and adequate training. One corporation which implemented its IT project, taking the above success factors into consideration was Dell Computer Corporation. Dell’s business strategy to incorporate principles of e-commerce marketing channel has put them on Fortune 500’s top five “most admired” companies since 1999, with profits nearing $4 billion per year (Kraemer & Dedrick 2001).

Dell mainly focused on improving the service delivery to their customers and increasing profitability. Initially, Dell applied business process reengineering (BPR) approach by installing custom software technology which centralized product information, and gave provision for electronic purchasing and payment (Efraim & Linda, 2010). Progressively, Dell incorporated advanced information technology systems into their business model for better service delivery. Business strategies such as direct marketing online and build-to-order production were efficiently coordinated through these systems. The case provides valuable insights into how IT can be applied to achieve speed and flexibility in an industry in which time is critical.

Table 3 below summarizes various business strategies practiced by Dell through application of diverse information technology systems.
### Table 3: Business Strategies and IT at Dell Computer Corporation

<table>
<thead>
<tr>
<th>Business Strategy</th>
<th>IT Application</th>
<th>Performance effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Sales</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Business – to-Business (B2B) | Dell Plus Premier Pages Dell online internet | – Establish better business relationship  
– Understand customer market demand  
– Introduce new technology to customer businesses in real time.  
– Encourages Customer relationship Management (CRM) |
| Business – to-Consumer (B2C) | Dell Plus Premier Pages Dell online internet Dell online catalogs |               |
| Build-to-Order   |               |                    |
| Enterprise Resource Planning (ERP) | Dell Order Management System (DOMS) E-mail | – Meet special customer requirements  
– Advance order notification  
– Improved control on operations  
– Allows understandable communication with customers during product designing process.  
– Efficient monitoring & evaluation of designed product.  
– Reduces inventory channel process |
| Direct Distribution | Dell Integrated Logistics Information to Run the Business (IRB) | – Information on shipment is transparent to customers  
– Allows customers to access consignment shipment details online.  
– Promotes production and distribution globally and locally.  
– Promises on time distribution  
– Wins customer confidence |
As a result of these IT systems, in 1998 Dell Computers achieved a revenue growth of 16.75, 10% above the industry standard, by employing just 55,000 people.

**Table 4: Comparison of Revenue growth in similar firms**

<table>
<thead>
<tr>
<th></th>
<th>DELL</th>
<th>Hewlett-Packard</th>
<th>IBM</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market cap</td>
<td>82.29</td>
<td>60.17</td>
<td>121.16</td>
<td>112.93</td>
</tr>
<tr>
<td>Employees</td>
<td>55,200</td>
<td>151,000</td>
<td>329,001</td>
<td>341</td>
</tr>
<tr>
<td>Rev growth</td>
<td>16.70%</td>
<td>9.4%</td>
<td>8%</td>
<td>6.20%</td>
</tr>
</tbody>
</table>

(Source: Dell Annual Report: 1998)

Information technology drove the Direct and Build-to-Order business strategies which eliminated inventory in the channel, provided information on and access to the final customer, with additional services. Collectively, these IT systems helped to create a strong relationship between Dell and its customers with increasing profits. Indeed the use of SCM helped Dell to achieve greater heights. Table 4 also shows an important trend of Dell Computers. Employee count is lesser than other two giants, IBM and Hewlett-Packard. However, revenue growth is the highest with Dell Computers. IBM has 6% greater employee count but its revenue growth is 10% less than Dell Computers. These revenue levels depict that employee productivity is high in this high tech environment, as compared to their competitors. Additionally, HRM could be adopting best practices such as employee motivation and training to achieve the above results.
3.2 “The Sydney Water Customer Information and Billing”, An Unsuccessful Story of IT

Sydney Water’s Customer Information and Billing system (CIBS) project was intended to improve service to customers, to fill gaps in existing information systems and to provide business efficiencies. The project required the solution to be integrated with 12 existing major internal business systems and over 60 external party interfaces. In June 2000 it rewarded the tender to PricewaterhouseCooper’s to build and implement CIBS. The core package came from the UK-based vendor. CIBS moved into the design and construct phases. There were three phases of the project, where only phase one was fully implemented. Phase two did not achieve its full functionality while phase three was never implemented.

Sydney Water terminated the CIBS project on 30 October 2002. The Board stated that it had become concerned that the project was not reaching acceptable standards and that there were excessive costs and delays.

Sydney Water had originally expected CIBS to be operational by February 2002, at a cost of $38.2 million. Before the project was stopped, the cost had increased to $60 million. Table 5 below briefly outlines the probable factors of failure in the Sydney Waters case.

Table 5: Project failure factors

<table>
<thead>
<tr>
<th>Factors</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager</td>
<td>The Project Manager should be appointed, who have the right skills and capabilities. Her incompetence was proved in her dissatisfactory performance review in 2001. Project Director was appointed at a very later stage to cover up.</td>
</tr>
<tr>
<td>Project Team</td>
<td>The Project team was not properly implemented, as the CSD Staff increased from 10 to 90 staffs. The departmental linking was not present; as a result there were a lot of time delays in completion of the project. For instance there was no link between finance and steering team. The teams were not integrated.</td>
</tr>
</tbody>
</table>
Proper Detailed Planning

There was no proper detailed planning at the initial stage of the project.

The Scope, Objectives and Outcomes

The project team did not set its objectives right, and the outcome of the project was not determined.

Top Management Support

The Top Management should have been a part of the project management team, as they know what the company outcomes should be. Additionally, customer service staffs were only engaged in the later stages of project.

Manageable Technology

The Technology they were trying to cope up with was not manageable and the backup service was not guaranteed. A new technology was being created. No IT architecture framework was in place.

Risk Management

There was no stated Risk management Policy and the System should have been tested simultaneously with the current system and then converted to the new system. There was no fall back strategy.

Clear defined Budget and timeframe.

The Budget of the Project was not clearly defined and a strict timeline should have been in place to deliver the project.

Quality Control

There was no quality control. If the system development was quality controlled 102 errors would have been picked up.

These factors are reiterated by Hospodar and Trevisan (2008), in their article “a tutorial on why information technology fails”. The major factors discussed in this article were poor project team composition, inappropriate technology base, no senior management involvement, escalating project cost and undeveloped project goals. Basically the conclusion is that IT projects fail not only because the software doesn’t work but also because there is a flaw in project management, lack of team collaboration, lack of skilled workforce, poor infrastructure and unclear goals.
4.0 Recommendations

Every business exists to make profits. To succeed in IT projects with a positive financial return, we recommend that organizations should justify investments according a business plan model presented by the IT Project Review and Oversight treasury board of Canada. A detailed explanation and queries can be assessed at <http://www.tbs-sct.gc.ca/emf-cag/business-rentabilisation/bcg-gar/bcg-gar01-eng.asp> [Accessed 18 December 2011].

Figure 5: A Business Case Model
Business case outlines the reasons for initiating a project – including cost benefit analysis. As explained on Wikipedia, the purpose of a business case is to cause senior management to recommend projects with positive return with a proper valuation on risks involved, justify value of the project to the business and enable management to objectively measure the subsequent achievement of the projects benefits. The business case should be done by responsible departments; else it will not be aligned with skills and experience of the users. In addition, all key stakeholders should be involved to have transparency in decision making.

This model is divided into three stages, namely a) Strategic Context, b) Analysis and Recommendation, and c) Management and Capacity. Stage 1 involves identifying the business opportunities and problem, and aligning these to the business goals. An analysis on how the desired business outcomes should also be conducted here. Finally this stage should relate the investment proposal and how it will help to achieve strategic goals, hence indicating the value IT investment. However, if the project does not help in achieving the business strategic goal maybe companies should redesign the IT model.

Stage 2 demonstrates the importance of due diligence in any project approval process. Initially several options should be laid out, preferably a minimum of three for better analysis. We recommend that in this process all stakeholders should be involved. Customers would inform about what their needs are, employees will inform what skill sets exists and what is required, while managers would know the proper resources required to execute those options. Inevitable, a rigorous selection criterion is preferred. The next step of this stage is to short list some viable options. It is recommended that a thorough SWOT analysis to be done on all options identified and align the business goals with the opportunities and strengths presented. The justification should also include benchmarking, capacity and cost-benefit analysis.

Methods such as return on investment (ROI) and revenue models must be used as well. ROI “is the ratio of money gained or lost (whether realized or unrealized) on an investment relative to the amount of money invested” (<http://en.wikipedia.org/wiki/Rate_of_return> [Accessed 14 December 2011]). The most accurate of all ROI calculation is the net present value
(NPV) calculation because it takes into account the time value of money. Whenever projects have negative NPV values, they are not undertaken as the ROI is negative.

On a similar note, “a Revenue Model lays-out the process by which a company actually makes money by specifying how it is going to charge for the services provided” (www.1000ventures.com/business_guide/revenue_model.html). This is used to evaluate profitability of IT projects, apart from evaluating the return on investment (ROI). Typical revenue models include sale of products, charges for differentiated value added services or promotion through SMS.

In this stage of the business model we also believe that productivity paradox should be an integral part of the business case. The productivity paradox can be seen as an example of diminishing marginal returns on technology, hence relatively slow growth of productivity at the economic level. “Revenues gained by a company through productivity will be hard to notice because there might be losses in other divisions or departments of the company. So it is again hard to measure the profits made only through investments in productivity” (http://en.wikipedia.org/wiki/Productivity_paradox) [Accessed 13 December 2011]). Basically this means that even though proposal seems to meet the business goals, will it indeed help increase productivity, or will other costs offset this achievement. After weighting all the costs and benefits, the most viable option should be selected here.

Stage 3 is yet another important stage of any successful project. All stakeholders want assurance that they will get a positive return on investment. Consequently it the job of the Board members and the senior management team to have strict guidelines in place to achieve the desired business outcomes. In conjunction with the IT strategy, other equally important strategy includes project management, risk management, change management, performance management, and governance and oversight functions. Sydney Waters experienced a loss of $60m because none of the above strategies were aligned with the IT project that was undertaken.

Hospodar and Trevisan (2008) further suggested few actions to be undertaken to reduce further harm. Firstly, the failure should be communicated thoughtfully to the entire project
team, in a respectful and caring manner. This will ensure morale of the team is not damaged, and hence giving them better hope for future projects. Another way to reduce harm is to examine the cause of failure. This is required to refrain from losing important information, understanding the underlying causes, and being responsible for all decisions and actions. Consequently, everyone will be prepared in the future. When companies report their failures instead of hiding them, they could learn from their mistakes in an effective manner.
5.0 Conclusion

In conclusion it can be said that information technology is the way forward. Businesses can reap benefits amounting in billions if IT is used and implemented properly. Economic prosperity, social inclusion and better public services are just few benefits derived from this great invention. Unfortunately, there are few disadvantages of IT such as cyber-crimes, pornography, hacking and negative environmental impact.

Cost benefit analysis is equally important to justify IT projects. A comprehensive business process reengineering should be conducted, core business to be defined and key indicators taken into consideration. In addition, IT projects should be evaluated against revenue models and a well-defined business case. The business case model outlined in figure 5 is a must be followed to achieve business goals with a positive ROI.

Success stories like Dell Computers can be adopted in organizations to rationalize the use of IT. However, we also have such stories as Sydney Water to learn from, where the causes of failure are lack of responsibility, commitment, knowledge and management. Indeed these factors can be avoided if proper strategies (as identified in Table 3 and 5) are in place.
A review of major aspects of Economics of Information Technology

6.0 References


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7.0 Appendix

Appendix A
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Appendix B