

# **ECONOMIC CYCLE AND INFORMATION TECHNOLOGY MANAGEMENT**

**Explorative survey of effects and challenges**

Master's Thesis  
in Information Systems Science

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<p>This master thesis aims to find out by literature review the interrelations between economic cycles and information technology (IT) stages and deployment. In furtherance of this aim, an explorative survey analysis of the opinions of IT managers in Finland about how the economic environment influences IT management and deployment was analyzed.</p> <p>By identifying recent economic cycles and IT infrastructure cycles, some inter-relations was observed. The effects of economic cycle on IT and IT deployment in organizations is difficult to prove although there has been some obvious reductions in IT project expenditures and in some circumstances an abrupt postponement of ongoing IT projects during recessions.</p> <p>The result of this study is based on the opinions of 249 IT managers. First, there was an evaluation in performance matrix on how organizational objectives including IT are affected by the economic situation. Some effects were noticed in this population, but they were not statistically significant differences. Therefore an explorative analysis of factors affecting different key phenomena of IT management and deployment were made. In the analysis, it was observed that IT manager's opinions seems to be most homogenous in the following variables: 1) Trying to increase efficiency of IT by cutting down IT costs, 2) Postponing IT purchases and investments, 3) Requiring extremely short pay-back times from IT investments. The explanation for the homogeneity in financial items might be because of the pace of change and invention in the field of IT.</p> <p>As a result of the rapid pace of change in IT, organizations need to always keep up with budgets and investments into IT to derive the full benefits from IT. To be able to stay ahead of economic cycle changes, IT managers in particular and managers in general should continually scan the business environment for signals of economic cycle changes and subsequently implement programs and policies to effectively mitigate the effects of economic cycle changes on their businesses.</p>			
Key words	Economic cycle, Information Technology, Investment		
Further information			

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# 1 INTRODUCTION

## 1.1 Research background and motivation

The importance of economic cycle to the fortunes of businesses around the world cannot be underestimated. This is because economic cycle impacts businesses both local and international directly due to the emergence of globalization of trade and inter-dependencies of businesses (Ba, 2018). Additionally, the formation of economic unions such as the European Union (EU), formation of free trade areas such as the North American Free Trade Area (NAFTA) and the synchronization of global trade practices by the World Trade Organization (WTO) have all given urgency to the topic. The impact and the incidence of economic cycle on businesses are huge and unpredictable. Besides, the control and mitigation of economic cycle as a macroeconomic factor is difficult (Ba, 2018). Furthermore, the pace of economic cycle change has accelerated recently with critical implications to business management and organizational survival (Borio, 2014).

Information technology (IT) is an important innovative tool for business delivery in the modern business environment. The adoption and deployment of IT in business organizations are no longer a luxury, but a routine requirement for business and service delivery and maintenance of competitive presence (Carr, 2003). Consequently, IT investments and expenditures have grown tremendously over the years in various organizations. This thesis, therefore seeks to examine the extent of the inter-dependencies between economic cycle and organizations' IT and IT deployment.

The motivation for the topic stems also from the author's previous studies in economics and finance, and the importance of economic cycles on the success or failure of organizations. The importance of IT in modern business performance, organizational development and customer satisfaction through fast delivery of services and products is also a catalyst for this research. Moreover, this thesis is an integral part of the author's master degree program. The master degree program is Global Information Technology Management (GITM) organized by the Turku School of Economics, University of Turku.

As a constantly evolving phenomenon, economic cycle has profound importance to the success of organizations as well as their current and future investment choices, which includes IT (Borio, 2014). Also IT is changing fast, and encompassing previously unthinkable segments of human existence (Carr, 2003). The topic is therefore interesting as the resilient adaption of these two phenomena can be seen a success factors of future organizations.

## 1.2 Research problem and boundaries

This thesis is intended to focus on the general effects of economic cycle on IT and its deployment. Consequently, this thesis attempts to answer the following research questions:

Research question	How it is tackled in the thesis
What are economic cycles and IT stage evolutions and have there been interactions between them?	By literature review
How economic environment influences IT management and deployment?	By analysis of survey data received for the purposes of this thesis
Are there interdependencies between IT, its deployment and economic cycle?	By literature review

Table 1.1 Research Problem and Solutions

Specific information and data from organizations for this kind of research is difficult to obtain. The data for the study was received from a national survey done in Finland and it was in Finnish language. The translation and interpretations of the data into English language was time consuming and challenging.

The nature of the study is explorative, thus, the aim is to find out from the data if and what kind of economic cycle effects on IT can be found. This kind of approach is challenging and vulnerable for misinterpretations. The data analyzed for the purpose of this research were the opinions of individual management members that was collected through the IT barometer survey. The IT barometer is an annual online web-survey of Finnish Data Processing Association (TIVIA) which is addressed to Finnish organizations with 500 or more employees and sometimes addressed to a sample of smaller organizations (Dahlberg, 2016). The barometer gathers the views and differences of opinions of business executives and IT managers about the utilization of IT and the expected changes in the future.

## **2 EXPLANATION OF ECONOMIC CYCLE AND INFORMATION TECHNOLOGY CYCLES**

### **2.1 Economic cycle**

An economic cycle refers to the changes in the general outlook of the economy of a country, a bloc, an economic union, or the whole world. Economic cycles, also refer to the periodic fluctuation of the economy; between periods of growth and contraction (Vanova and Petrikova, 2011, Owyang, et al; 2005). These changes in general outlook can be positive or negative. A positive economic outlook is a situation where economic forecasters predict a buoyant economy for a country, a financial bloc, or the whole world. In contrast, a negative economic outlook is a situation where economic forecasters predict a gloomy economy for a country, a financial bloc or the whole world. These forecasts are normally based on analyses of past economic data and analyses of current economic indicators such as inflation and employment forecasts (Kim and Burnie, 2002).

Furthermore, consumer confidence levels and opinions of economic experts are also given weight. To discuss further, the main indicators that watchers of the economy and business managers look out for during the cyclical changes includes; time, and the performance of the economy. These indicators are shown by gross domestic product (GDP) changes, and the periods between the changes, fluctuations in the general price level and rent, unemployment and the standard of living measurements (Vanova and Petrikova, 2011, Owyang, et al; 2005).

Therefore, in an economic cycle, as can be seen from the Figures 2.1 and 2.2 below, there can be periods of growth which means that indicators such as the gross domestic product (GDP), employment, and consumer spending will see a general rise in value terms within a specific country. In the same vein, there can be periods of contraction or recession, when there is lower employment, weak GDP growth, and lower consumer spending. GDP is the aggregate of the total economic activity within a specific country at a particular point in time, for example, one year. GDP is calculated by summing up all the prices of manufactured goods produced within a country, services, and all earned incomes of workers within a specific country at a particular point in time, usually one year (Ductor and Leiva-Leon, 2016).

Moreover, an economic cycle can be further classified into four main stages: an expansion or growth stage, peak stage, contraction or recession stage, and trough stage (Sharma, 2009) and as can be seen in figure 2.2 below which depicts the financial and business cycles in the United States. The expansion or growth stage is characterized by high levels of economic activity. This includes high employment of economic resources like labor, capital, land and corresponding increase in projects including IT projects. The

increased demand and usage of these resources lead to higher prices and higher returns for labor.

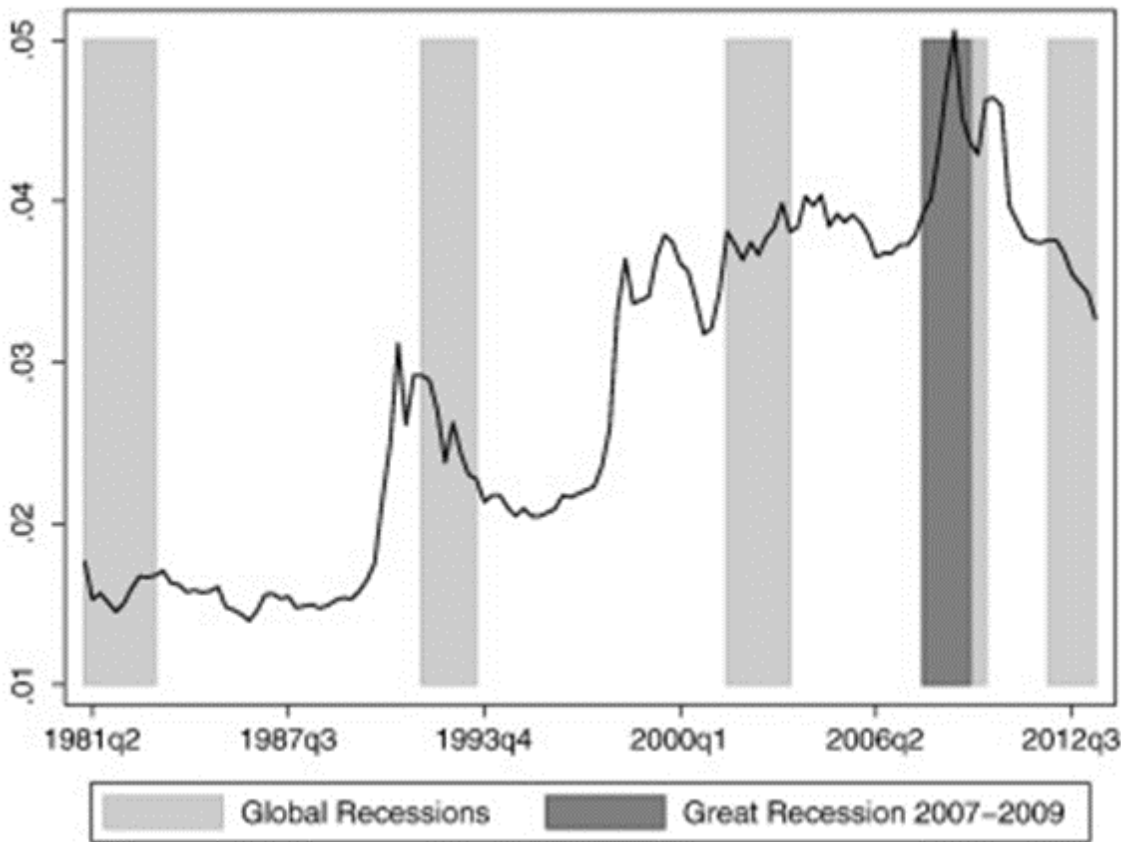


Figure 2.1 Global recessions in recent history

Source: Journal of International Economics, September 2016 Volume 102 pages 110-127 Dynamics of global business cycle interdependence Lorenzo Ductor, Danilo Leiva-Leon

Additionally, companies and organizations increase their capital expenditure and investments like IT projects with the aim of increasing productivity to make profit from the growth in the economy. Consumers also demand more goods and services from their high and regular incomes during the expansion stage of the economic cycle. As a result of these buoyant economic activities, there is high demand for credit from financial institutions. This higher demand for credit correspondingly leads to higher interest rates. Revenue to the government in the form of taxes, royalties, and licenses also increases. This in turn enables the government to finance infrastructure projects such as roads, highways, hospitals and other capital-intensive projects. Social intervention programs including health-care, benefits to the marginalized, and educational investments are enabled as a result of the increased revenue to the state (Ductor and Leiva-Leon, 2016).

After the expansion or growth stage, an economic cycle reaches a peak stage as can be seen in the figure 2.2 below. The peak stage is characterized by full employment. This

level is attained when most of the productive capacity of the economy is fully utilized (Borio, 2014). Another feature of the peak stage is stagnation. Stagnation is reached when there is no prospect for further growth in the economy. Consequently, there is gradual decline in the economy, and the economy elapses into recession after prolonged decline.

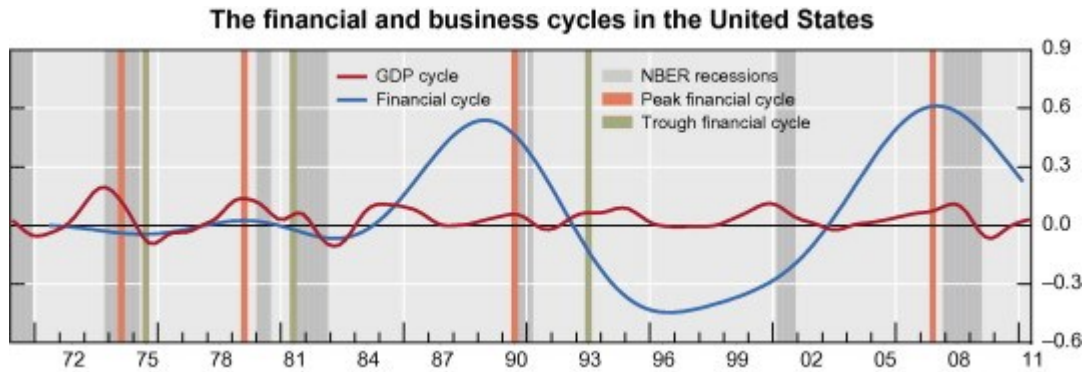


Figure 2.2 Table of Financial and Business Cycles in the United States

Source: Drehmann et al. pp19 (2012)

Contrarily, an economic cycle can be in a contraction or recession stage (Sherman, 2011). The recession stage is characterized by low economic activity, which stays for more than six months. This includes low or stagnant employment of economic resources, for example labor, capital and land. The redundancies of these resources lead to lower prices and a downward pressure on wages and salaries (Sherman, 2011). Consequently, companies and organizations reduce significantly their overall capital expenditure and investments. The aim is to conserve the meager resources and focus mainly on vital projects and investments.

Likewise, consumers reduce their expenditure significantly from luxuries including, holidays abroad, and spend on necessities such as food and health-care. As a result, the revenues that accrue to the government in form of taxes, licenses, and royalties decrease (Sherman, 2011). Subsequently, investments in infrastructural projects including roads, highways, hospitals and other capital-intensive projects are reduced. Social benefits such as generous health-care coverage, and educational investments and benefits to the vulnerable are likewise reduced. An additional structural feature of the recession stage is a fall in interest rates due to reduction of economic activities. The recession stage however can be stimulated back into growth through a combination of policies, if well implemented.

The last stage of economic cycles is the trough or depression stage (Alajoutsijärvi et al; 2012). The trough or depression stage is characterized by the lowest level of economic activity. During this stage, there is also the widest negative deviation. The economy slumps deeply into stagnation, but, the economy recovers after a period of time and new cycles begin.

## **2.2 Examples of economic cycles in recent history**

Economic cycles are replete with occurrence in global economic history. The boom and bust cycles happened during medieval periods, distant history and recent economic history Honkapohja (2009), Kaminsky and Schmukler (2008), Jonung (2008), Mendoza and Terrones (2012).

However, for the purposes of this thesis, the author will emphasize on the more recent and general economic crises that have had profound global impact and whose incidence were critical to organizational survival and business managers including IT managers (Stiglitz, 1999). General economic crises refer to the reductions of the economy in which real output measured in GDP terms reduces, which is contrasted with periods when the economy registers low economic growth (Grewal and Tansuhaj, 2001).

### **2.2.1 *The first oil crisis (1973)***

The first oil crisis began in October 1973 when certain Arab oil exporting countries who were members of the Organization of Arab Petroleum Exporting Countries (OAPEC) and also members of the Organization of Petroleum Exporting Countries (OPEC); along with Egypt and Syria announced an oil embargo and boycott against specific countries namely Canada, Japan, Netherlands, the United Kingdom (UK), and the United States (US) (Baumeister and Kilian, 2016).

The embargo was placed to register their displeasure and disquiet over US foreign policies in the Arab world and the overt support of Israel by the US. Additionally, the Arab members of OPEC wanted to use their leverage on oil supplies to influence the price movements of the commodity on the global market.

The First oil crisis had significant challenges on the economic situation at the world stage. Consequently, as a result of the oil crisis there was spiraling inflation and price increases (Bernanke et al, 2004). As a result of the general use of oil in the everyday activities of modern economies, the quadrupling of the oil price from \$3.00 per barrel at the beginning of the crisis to \$12.00 caused significant price increases across board.

Additionally, to curtail the unpleasant price increases occasioned by the oil shock, there was general price controls and oil rationing. This resulted in massive drop in economic activities and reduction of investment budget of organizations during the peak of the crisis (Bernanke et al, 1997; Barsky and Kilian, 2004). Furthermore, to preserve their budgets and contain the negative effects of the crisis, countries adopted conservation methods along with reduction in demand of oil. Alternative energy sources were explored to counter the negative effects of the oil crisis. This led to research into solar energy and nuclear energy as sources of electricity to supply energy to industries during the period

of the crisis. As a result of the spiraling prices of crude oil, there was extensive macroeconomic dislocations especially on oil importing countries. These dislocations included balance of payment deficits and reduction in investments (Kallis and Sager, 2017). Consequently, investments by organizations into general corporate infrastructure including IT investments saw massive reduction and in some instances IT investments were scrapped completely (Kallis and Sager, 2017).

### 2.2.2 *The second oil crisis (1979)*

The second oil crisis like the earlier crisis in 1973 was associated with events and happenings in the Middle East; but was in part driven by heavy demand across the globe. The held opinion about the beginning of the crisis was the reduction in oil output by Iran as a result of the Iranian Revolution. The Iranian Revolution begun slowly in the latter part of 1978, which forced the Shah of Iran out in January 1979 to be replaced by Ayatollah Khomeini in February 1979 (Baumeister and Kilian, 2016).

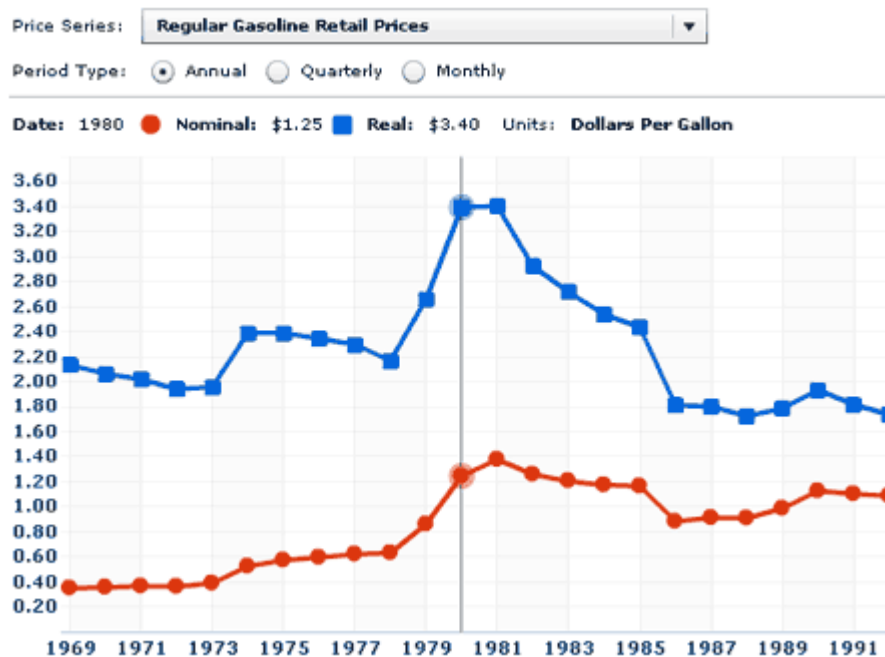


Figure 2.3 Gasoline Price movements in Late 1970s

Source [//www.e-education.psu.edu/egee120/node/292](http://www.e-education.psu.edu/egee120/node/292)

With the withdrawal of Iranian oil from the global market, shortages arose, which triggered the second oil crisis. By the end of 1978, oil prices moved from \$13 a barrel to \$34 a barrel, resulting in huge changes to the world economy. Panic however led to the 150% increase in price of gasoline and its related products; due to fear of repeat of the events of

1973. This can be seen from the figure 2.5 above (see the sharp rise on the blue line from 1977-1980). The panic arose because of the growth of oil consumption and its impact on the market, disruption of contractual agreements and breaking of industry vertical integration and creation of new buyers, the inconsistent programs and contradictory policies of the industrial nations, oil exporters taking advantage of any opportunity to increase their incomes and the power of emotions which include uncertainty, anxiety, confusion, fear and pessimism (Baumester and Kilian, 2016).

The long run consequences of the second oil crisis were higher prices of gasoline, petroleum products, diesel, heating oil, residual fuel oil. Additionally, there were higher prices of all products and services derived from petroleum. (Verleger et al, 1979). The higher prices for energy products made most corporations to drastically reduce their investments into organizational infrastructure including information technology (IT) investments and upgrades. Furthermore, pressing and urgent IT investments in corporations were abandoned and others were rescheduled indefinitely (Kallis and Sager, 2017).

### **2.2.3 The stock market collapse (Black Monday) 1987**

On October 19, 1987, a day that has been christened 'Black Monday', stock market, along with futures and options market mostly in the United States crashed. The precursor to the crash was when the Dow Jones Industrial Average (DJIA) shed 508 points or 22.6% in value, and also the Standard and Poor (S&P) 500 lost about 20% in value (Carlson, 2007; Shiller, 1987). This is shown in figure 2.6 below, where the DJIA fell from a little over 2500 points to below 1800 points.

The crash was as a result of a two-week trading period where the DJIA shed 15% of its market value traded on the stock exchange. The main causes of the 1987 stock market collapse are briefly explained as follows.

The manner of trading that existed during the period of the stock market crash, called program trading worsened the lingering crisis further. Program trading which involves portfolio insurance, was designed to protect retail investors from losses in the market. Overtime, many retail investors used portfolio insurance which made the problem entrenched. The full impact of portfolio insurance to the stock market crash cannot be definitively ascertained (Carlson, 2007).

Additionally, difficulty in obtaining information in the chaotic and changing environment allowed the problem of the stock market crash to deepen further. During this period of uncertainty; as a result of rapidly changing prices, confusion and rumors about market closings; investors resorted to herd behavior (Carlson, 2007). This led to panic behavior.

In addition to the above factors, the poor capability of information technology systems for processing large amounts of transactions at any given time; and the margin calls



charged for processing of transactions on the exchange enabled the crisis to deepen. The margin calls reduced market liquidity and the availability of funds to stimulate the stock market (Carlson, 2007).

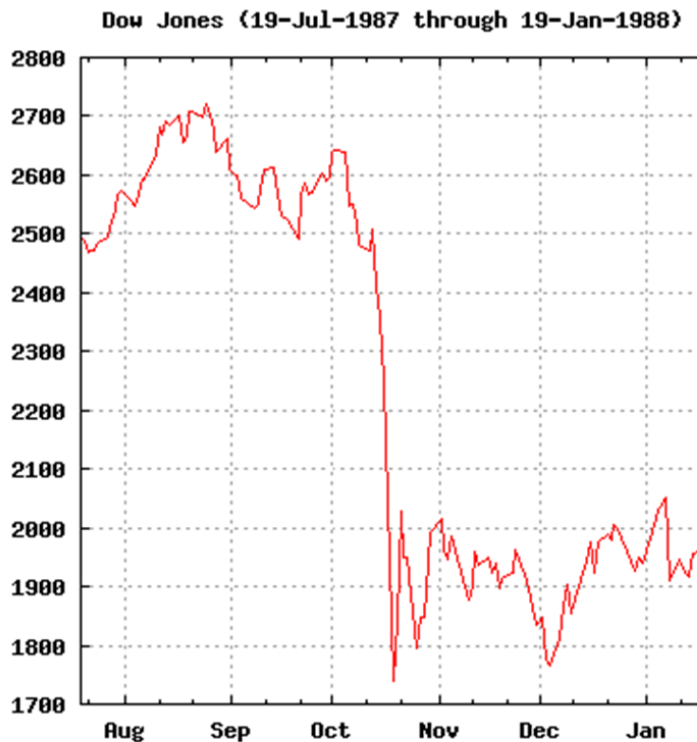


Figure 2.4 Stock price movements of Dow Jones

Source: [www.stockpickssystem.com/1987-stock-market-crash](http://www.stockpickssystem.com/1987-stock-market-crash)

As in most crisis situations, to stimulate interest in the shares of companies listed on the stock exchange during the crisis, funds of the company were diverted to share buyback schemes to the detriment of corporate investments such as information technology (IT) and the company-wide deployment of information technology (Carlson, 2007). The precarious financial conditions of most organizations during this period made investments into IT and IT deployment within these organizations to be drastically reduced; or to be indefinitely postponed until these organizations financial conditions improved. This stymied the deployment of IT within organizations during the period of the crisis.

#### **2.2.4 The Asian financial crisis (1997)**

The Asian financial crisis began when on July 2, 1997, Thailand a south-eastern Asian nation floated its national currency; the Thai baht, after a sustained attack from currency speculators. The flotation of the Thai national currency; the baht, triggered a

financial and economic collapse that spread to other 'Asian Tiger' economies namely: Malaysia, Philippines, South Korea, Thailand and Indonesia. The contagion caused the south eastern 'Tiger economies' to contract dramatically causing extensive insolvencies of companies that were over-exposed to foreign currency risk (Hale, 2011). The underlying factors that led to the crisis are briefly explained as follows.

Firstly, the precursor to the crisis stems from the outright corrupt lending practices that prevailed at the time. The industrial conglomerates that existed before the crisis erupted, were in a corrupt relationship with the financial institutions that enabled credits and loans to be advanced without prudent assessments. As a result of this corrupt relationship, the credits and loans were poorly supervised by the financial institutions leading to wanton waste and diversion of credits and loans from assigned projects (Radelet and Sachs, 1998, p3).

Secondly, non-market criteria of credit allocation was a contributory factor to the crisis. The industrial conglomerates across the 'Tiger economies' had a corrupt relationship with the prevailing national governments at the time. This industry-government relationship enabled the conglomerates to contract huge loans from the financial institutions, usually foreign currency denominated, to execute projects that were not based on sound market indicators (Stiglitz, 1999, p. 1510). This action caused many bad loans in the asset portfolio of banks with most of the loans been foreign currency denominated. Consequently, the financial system that prevailed at the time in the 'Tiger economies' were susceptible to currency speculators and outside financial bubbles (Vallorani, 2009).

Thirdly, current account imbalances and poor macroeconomic fundamentals contributed to the Asian Financial Crisis (Corsetti et al, 1998). The 'Tiger economies' were also dangerously exposed in their current accounts, which measures the trade activities with the rest of a specific country's trading partners. In addition to this, the macroeconomic indicators (inflation, interest rate, current accounts, etc) of the 'Tiger economies' during the time of the crisis were not strong (Stiglitz, 1999). This was due to lax regulation of the financial system as a result of a long tradition of cheap credit and lax regulation of industry-government agencies. Therefore, when Thailand decided to float its national currency; the baht, the effects were contagious. The atmosphere during the heat of the crisis made general organizational infrastructure and human capital investments, including corporate IT investments, to be reduced and planned infrastructure investments to be deferred into the distant future when the macroeconomic environment stabilizes (Stiglitz, 1999, p318).

### **2.2.5 *The dot com crisis (2000)***

The second half of the 1990's witnessed a quick rise of a new booming economy, with attendant high growth rates in the stock markets fueled by a visible presence of venture capital and initial public offering (IPO) funded companies in the technology and internet subsector and its related fields. Consequently, the name 'Dot-com Economy'; which signals the commercial websites that so many of these new technology and internet subsector companies took, was used as a pseudonym to refer to companies with internet domain name ending with ".com"(Goodnight and Green, 2010).

This novel industry with its high earning potential triggered a high investment frenzy and stock speculation among investors, causing a general rise in prices of technology and related industries' stocks on the stock exchange especially the NASDAQ composite. At the peak of this novel industry's frenzy, all sound investment guidelines were not strictly followed, due to the eagerness of investors and venture capitalists to be part of the new business action, and the investment craze. Therefore, the supply of investment capital in the form of venture capital funds and IPO were abundant (Lowenstein, 2004; Goodnight and Green, 2010).

The excess oversupply of capital to the technology and internet sub sector companies listed on the stock exchange caused these companies stock to be overvalued. This in 1996 made Alan Greenspan, the then chairman of the United States Federal Reserve to caution against "irrational exuberance", concerning the replacement of the sound investment guidelines with momentum investing (Metrick, 2007; Goodnight and Green, 2010 p.124).

On March 10, 2000, the NASDAQ composite the stock index of the technology and related industry's peaked at 5,132.52 points, the ensuing days marked the end of the booming novel industry after a flurry of technology and internet and related industry's stock prices started to collapse (Goodnight and Green, 2010 pp128), as seen in the figures 2.7 and 2.8 below. The figures in figure 2.8 below tells of the high points of the technology stocks in the NASDAQ Composite during the peak at 5132.52 points and at its lowest level at 1,177.41.

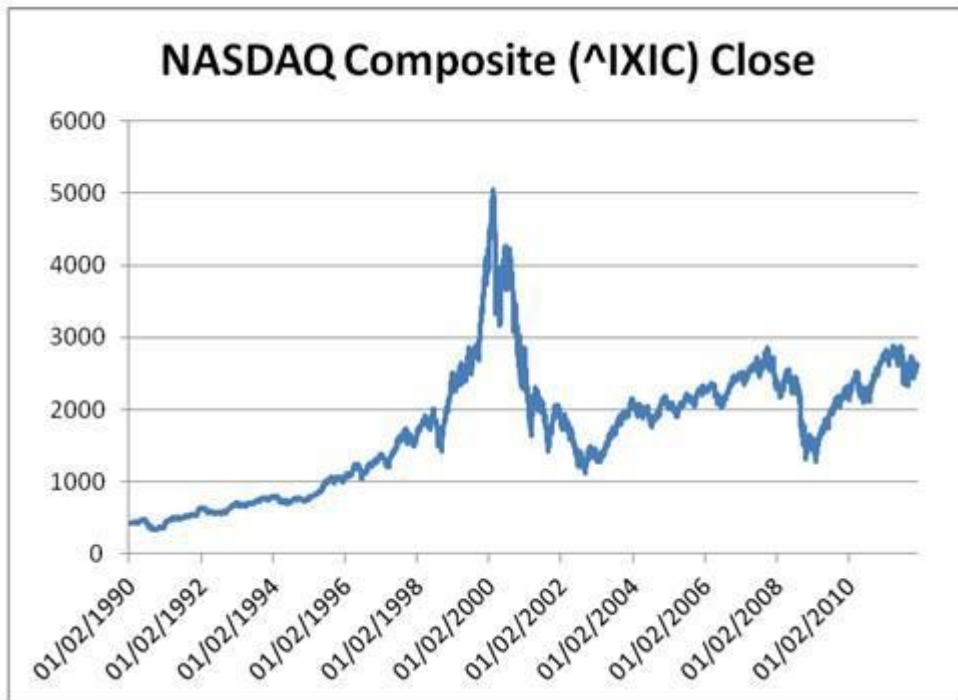


Figure 2.5 The close price of the NASDAQ Composite

Source: <https://seekingalpha.com/article/4079811-nasdaq-100-versus-2000-dot-com-peak>.

As a direct result of this crisis, organizations desire to invest in information technology (IT) and its related products declined. Information technology (IT) and IT deployment was therefore put on hold due to the competing demands from other sectors of most organizations (Panko, 2008).

Date	Open	High	Low	Close	Volume	Adj Close*
Jan 30, 1995	759.63	760.57	751.49	751.83	259,470,000	751.83
Mar 10, 2000	5,060.34	5,132.52	5,039.35	5,048.62	1,992,170,000	5,048.62
Sep 23, 2002	1,209.13	1,209.72	1,177.41	1,184.93	1,443,330,000	1,184.93

Figure 2.6 Historical prices of the NASDAQ Composite ) at the start of its growth in 1995, to its peak in 2000, to its huge fall in 2002.

Source: <https://writepass.com/journal/2012/10/2001-dot-com-bubble-its-causes-effect-and-lessons-learnt/>

### **2.2.6 The financial crisis (2007-2009)**

The economic crisis of 2008 variously described as the credit crunch traces its routes to the United States of America's housing bubble. The availability of cheap credit to potential homeowners with poor credit background known as "subprime" fueled a housing boom in the early to mid-2000. The cheap credit was enabled by the lower interest rates enforced at the time by the US Federal Reserve (Acharya, et al; 2009).

The boom of the subprime lending was underpinned by the belief that housing and property prices will keep rising; and also that property price collapse will be city specific or state-specific which would then be catered for by price rise in other cities and states (Allen and Carletti, 2009). In effect the subprime lending was made to look risk-free.

Financial engineers consequently turned the subprime lending into a financial asset named collateralized debt obligations (CDOs). This made it easy for other financial institutions around the globe to purchase these mortgage-backed securities. The crisis started when the US Federal Reserve raised interest rates, which made the subprime mortgage holders struggle to keep up with payments on schedule. Massive defaults on mortgage payments coupled with saturation of the United States housing markets caused a downward spiral in the prices of properties across the United States (<https://www.economist.com/schools-brief/2013/09/07/crash-course>; McKibbin and Stoeckel, 2009). The crisis worsened when trust in the financial markets waned; and banks started filing for bankruptcies whilst others collapsed, especially Lehman Brothers, a bank in the United States.

The underlying causes of the financial crisis has been attributed to greed on the part of bankers, weak regulation from the central banks and the herd effect (Carmassi et al; 2009). Consequently, during the heat of the crisis, most corporations devoted their meager resources to ensure organizational survival to the detriment of investing in information technology (IT) and IT infrastructure and deployment (Panko, 2008).

## **2.3 Significance of economic cycle**

Economic cycles are of profound significance to business managers (Grewal and Tansuhaj, 2001). Firstly, economic cycle predictions aid organizational planning by managers. The ability to predict the nature of the economy informs management of organizations the urgency to plan for the needs of the organization in advance. These predictions also enable the management of organizations to know in advance what to expect (Grewal and Tansuhaj, 2001).

Additionally, economic cycle predictions help in the allocation of organizational resources. After predicting correctly, the managers of organizations are better able to maximally allocate the scarce resources of the organization. Another importance of economic cycle prediction to the organization is the ability to help predict the profit or loss position in a fiscal year. A well informed forecast enables managers to anticipate the profit or loss position of the organization and execute plans to achieve the organization's plans and objectives (Grewal and Tansuhaj, 2001 p68).

## **2.4 Features of economic cycles**

To start with, as a result of the occurrence of economic cycles in the wider economy, economic cycles cannot be predicted with accurate precision (Sun, et al; 2014). This unpredictable trait of economic cycles therefore, makes management of organizations during these periods of unpredictability difficult. Secondly, the incidence of economic cycles is characterized by a high degree of uncertainty (Wolf, et al; 2012). This uncertainty likewise makes long-term business planning and management difficult due to inadequate market information about future market developments and prospects (Abdul-Gader and Kozar, 1995).

Moreover, economic cycles cause turbulence in the operating environment of business organizations. This turbulence stems from the uncertainty and the difficulty in accurately predicting the future of the market and market developments (Wolf, et al; 2012). During economic cycles, there are also panics which spreads from one industry or country to another industry or country. These panics are as a result of the instability of economic indicators such as price, wages, raw material availability etc. Bubble collapse in one industry is also transferred to another closely related industry leading to a contagion (Daniel, et al; 2011).

Furthermore, during economic cycles organizations, governments and individuals exhibit high levels of dynamism. This dynamism is necessary to adapt to the constantly changing events and for organizational survival. The external economic environment is also volatile during economic cycles. This volatility originates from the constant movements in prices and other economic indicators (Rothbard, 2000).

Another notable characteristic of economic cycles is the coincidence of technological innovations with changes in the economic prospects especially information technology (IT) innovations (Perez, 2005). In addition to the above mentioned characteristics, during periods of economic crises and declines, aggregate demand for goods and services reduces and consequently total production of goods and services decline in tandem (Masarenhas and Aaker, 1989). Economic cycles and crises are also spread from country,

region, bloc or industry to another country, region, bloc or industry through the interdependencies enabled by globalization (Mascarenhas and Aaker, 1989).

## **2.5 Consequences of economic cycles on investment behavior and IT management**

The consequences of economic cycles on the operations of business organizations, countries, economic bloc, and industries can be varied depending on the period and severity of the cycle. The consequences of economic cycles, also can be observed within a specific industry, business organization, or a country more than other industries, business organizations or countries due to different responses that might be taken to address the challenge. Therefore, the consequences of economic cycles can be of both macro and micro significance. The readiness of individual business organizations to respond to the challenges posed by economic cycles has been termed “*organizational mindfulness*” (OM) (Wolf *et al*; 2012).

The first point under the consequences of economic cycles is the change in investment style of organizations toward cost reduction. This has been termed as “*defensive investments*” (Daniel *et al*; 2011). As a result of the instability and unpredictability associated with economic cycles, empirical researches have revealed that, business managers tend to invest in projects that can withstand the pressures on the business and also projects that can mitigate threats to the organization’s survival during the brunt of the cycle. Therefore, projects including IT projects that are not compatible with this business strategy are abandoned or drastically reduced (Daniel *et al*; 2011).

Secondly, due to resource constraints occasioned by economic cycles, business organizations align their information systems (IS) and information technology (IT) investments with the overall business strategy (Daniel *et al*; 2011). The alignment of IS/IT investment with business strategy is aimed at reducing cost and also deriving maximum benefit for the organization.

Moreover, in order to cope with the uncertainties associated with economic cycles, managers of business organizations adopt and widely deploy IT innovations that is able to help their businesses and organizations survive the quick environmental and operational changes in the firms’ macro environment (Wolf *et al*; 2012). In line with the cost reduction strategy discussed above, business organizations make IT innovations part of their operations in order to reduce the overall cost during economic cycle periods.

Additionally, during the heat of economic cycles, firms tend to imitate the success stories of other firms’ IS/IT adoption and devolution. This action is as a result of scanty sources of information and the rapid pace of information change. This imitation of other

firms leads to what has been termed '*bandwagon phenomena*' (Abrahamson and Rosenkopf, 1990). Bandwagons are defined as "*diffusion processes that are reflected by the individual or organizational adoption of an idea, technique, technology or product solely as a result of the number of organizations that have already adopted it*" (Abrahamson and Rosenkopf, 1990).

Furthermore, organizations become much more aware of their positions in their respective industries, and changes that must be implemented in order to re-position their organizations to their desired targets. This ability to recognize organizational position and tailor appropriate remedies to ensure business or organizational survival is termed '*organizational mindfulness*' (Wolf *et al*; 2012).

In concluding the consequences of economic cycle on business organizations, studies conducted by Sun *et al*; 2014 have shown that, there are changes in the composition of management board members during economic crisis and cycles. Management board of organizations become more receptive to women participation and leadership during economic crisis. Also, management board become more receptive to new ideas during periods of economic crisis (Sun *et al*; 2014).

## **2.6 Information technology (IT) infrastructure cycles**

Information technology infrastructure encompasses all the hardware and software components of technology and communication, and the services involved which are enabled by the components thereof (Martin *et al*; 1999; King *et al*; 1989; Stump and Sriram, 1997).

The services include the following:

- Telecommunications services: According to ([www.gartner.com/it-glossary/telecommunications\\_services](http://www.gartner.com/it-glossary/telecommunications_services)), telecommunications services consists of provision of fixed line and wireless services; offering voice, telephone services, data and high density data transmission services. Telecommunications services also includes mobile services and non-voice data transmission services like fax, video, image etc.
- Data management services: According to ([www.techtarget.com/definition/data-management](http://www.techtarget.com/definition/data-management)), data management services consists of making and implementation of architectures, systems, guiding principles, frameworks, practices and methods in order to manage, control the information needs of an entity including businesses in an effective manner.
- IT education services: IT education services comprises formal and informal training put in place by an organization to enhance the IT knowledge, awareness and skills of its staff to improve the productive capacities of its staff and to promote IT adaptability.



- IT research and development services: With explanation from ([www.enterprisemanagement.com/professionals](http://www.enterprisemanagement.com/professionals)), IT research and development services provides IT teams with in-depth research on key IT technologies, processes and organizational issues.

A firm's IT infrastructure can be categorized into three major sub-divisions as can be seen in Figure 2.7.

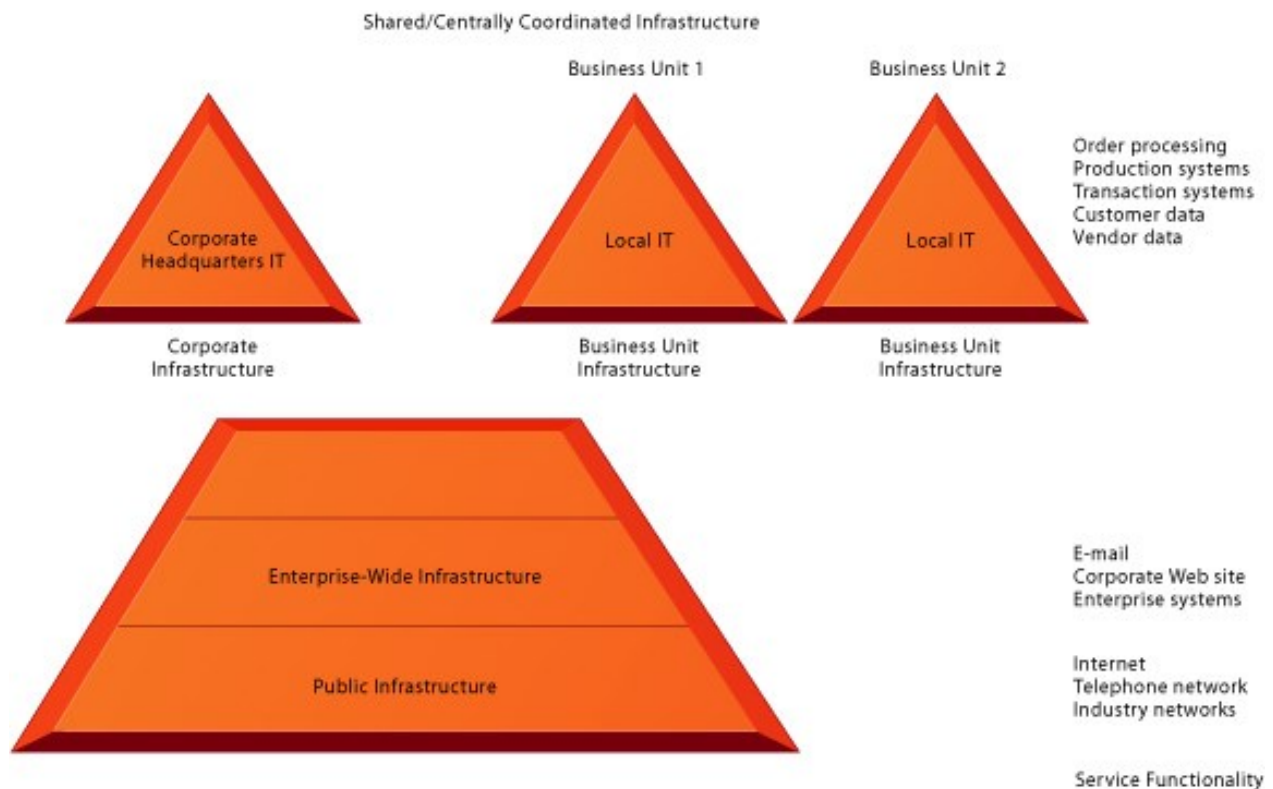


Figure 2.7 Levels of IT infrastructure

Source: Weill, et al (2002)

IT infrastructure exists at three different levels: public, enterprise, and business unit. Each level of infra-structure provides a set of IT services and capabilities (Weill et al. 2002):

- public infrastructure
- The public infrastructure of a firm includes internet, public communications networks, cable systems, satellite systems and mobile communications networks.
- enterprise infrastructure
- Enterprise infrastructure examples are email, websites, intranets and extranets and enterprise applications.
- business units infrastructure

- Business units concentrate on the business sub divisions that serve the functional areas of organizations namely: sales and marketing, finance and accounting, production and manufacturing and human resources.

## 2.7 Evolution of IT infrastructure: 1930-2005

Information technology as can be seen lately has evolved through many stages over the years. The evolution of IT infrastructure will be briefly traced and discussed below.

- **Electronic accounting machine (1930 - 1950)**  
These machines began to perform the simple accounting and finance tasks given to staff of the finance and accounts department. As a result of this beginning, consequent IT development came under the purview of finance and accounts department (Rosenbloom, 2000).
- **General-purpose mainframe and minicomputer era (1959 - present)**  
The mainframe began with centralized computing with networks and terminals compressed together in the computer department of most companies. The mainframe has withstood the onslaught of current innovations due to its (mainframe) ability to process huge amounts of data and transmissions (Rosenbloom, 2000, Weiser and Brown, 1997).
- **Personal computer era (1981 - present)**  
The personal computer era has become the fulcrum around which current innovations in the IT industry revolve. The comfort enabled by the personal computer led to corporate adoption of the technology. Consequently, innovations and industrial applications were introduced to foster productivity (Weiser and Brown, 1997).
- **Client/Server era (1983 - present)**  
The increasing availability and spread of the personal computer (desktop and laptop) made organizations to replace some of their mainframes and minicomputers with the desktops and laptops. The use of the desktops and laptops were made possible by networking them together. This era marked a reduction of the costs involved in procuring a centralized form of computing (mainframes) (Bertocco et al; 1998).
- **Enterprise internet computing era (1992 - present)**  
This era has enabled an explosive growth in functionality as the problems created by proprietary, closed systems are being solved by open source software and other developments. There is still however the challenge of seamless and flawless dissemination of important business information across all levels within an organization (Fui-Hoon Nah et al; 2001).

## 2.8 IT and formation of attitudes toward IT management and behavior

Information technology (IT), according to Martin *et al.*; (1999); King *et al.*; (1989); and Stump and Sriram,(1997), is a terminology that includes all forms of technology that is adopted and diffused, to create, store, adapt, transform and transmit information through various modes. The modes of transmission include, business, data, voice communications, photographic images, multimedia and video presentations. These modes of transmission are however in-exhaustive due to constant inventions and innovations. Furthermore, information technology can be classified into computer hardware, software, communication systems, IT human resource, and resources that have been set aside to help achieve the above-mentioned capabilities (King *et al.*; 1989, Stump and Sriram, 1997).

Moreover, organizational IT infrastructure can be subdivided into internal IT infrastructure and shared IT infrastructure. Internal IT infrastructure include office automation, transaction processing systems, enterprise resource planning (ERP) systems, data warehousing systems, groupware applications, intranets, executive information systems etc. On the other hand, shared IT infrastructure include, inter-organizational systems, electronic data interchange (EDI), extranets, etc. (Ryssel et al; 2004).

Investments into IT are very important because of the numerous advantages that inure to the benefit of organizations when IT is properly aligned to their operations. Buxman and Gebauer, 1999; argues that IT is one of the most important source of success in any organization in modern day operations. According to an article by Winston and Dologite, 2002; internal organizational performance and efficiency increases as a result of IT investments.

Additionally, management of organizations become more effective as a consequence of investments into IT. Moreover, organizations gain strategic advantages over their competitors when they invest in IT and IT infrastructure (Cooper and Zmud, 1990; Iivari and Ervasti, 1994; Venkatraman, 1991). Furthermore, businesses and organizations gain when investments are made into IT by transforming their routine and work tasks; thus enabling business effectiveness (King, 1996). Lastly, organizations that invest in IT and IT infrastructure are able to offer better customer service than their competitors who does not invest in IT and IT infrastructure (Winston and Dologite, 2002)

Despite the important advantages of IT investments to organizations enumerated above, investments into IT are constrained as a result of the following factors and attitudes. To begin with, inadequate knowledge about IT and IT benefits is a major hindrance to investments into IT and IT infrastructure in organizations. Most of the senior managers, who are responsible for organizational IT planning and investment are not adequately knowledgeable about the benefits that the organization can get from IT. As a result, senior managers' commitment to IT investment and deployment is lax. Furthermore, senior

managers perceive IT and IT infrastructure to be a costly expenditure, and an added burden to the business rather than a necessity and an enabler of business (Jordan, 1999). Certain organizational and cultural behaviors also constrain managers from actively introducing and investing in IT and IT infrastructure (Hopwood, 1990).

Besides, most organizations' corporate strategies are vague, and are not adequately disseminated within the organizations to sustain a momentum of investments into IT (Reich and Benbasat, 2000). When the corporate strategy is adequately known, the corporate strategy is not straightforward; and the strategy is not easily adaptable to pressing trends (Baets, 1992). Lastly, due to the difficulty in identifying and quantifying the cost and benefits of IT investments, IT investments are constrained. IT and IT infrastructure investments are also affected by their intangibility; thus their benefits to organizations are difficult to measure (Powell, 1993).

Notwithstanding the constraints to IT and IT investments, positive attitudes by managers can help organizations to surmount the challenges and reap the benefits of investing in IT. Attitude, for the purpose of this thesis, is explained as the '*feelings that owners/managers attach to IT and the beliefs managers have about IT*' (Cook and Selltitz, 1964). Additionally, King *et al.*, (1990) posit that for effective and sustained investments into IT, organizations need what they termed an "*IT champion*". The *IT champion* will inspire and coordinate the IT process in organizations to enable change. Furthermore, the financial attitude to IT should change from regarding IT as cost to acceptance of IT as an investment (Earl, 1989).

In conclusion, as a result of the critical role played by IT in the daily operations of modern organizations, management should put in the necessary safeguards to protect their investments into IT (FEMA, 1996; Hardy, 1992). Management of organizations are also encouraged to comply with industry regulations, institutional demands and standards of IT infrastructure in close conformity with their strategic directions (Zhu, 2004).

## **2.9 Economic cycles and IT stages evolution**

Economic cycles and recessions have been with humanity for a very long time, since the beginning of all human economic endeavor. This reality has been portrayed in the previous pages as recent history of economic cycles have been explained. The incidence and occurrence of economic cycles, that is the boom and bust of the general economy (Sharma, 1999) is not an old phenomenon, neither can its future reoccurrence be empirically predicted (Grewal and Tansuhaj, 2001 p68).

However, adequate safeguards like financial controls and general organizational risk controls and management can be put in place by supervisory boards and management of organizations to mitigate the worst effects of its incidence and occurrence (Grewal and Tansuhaj, 2001; Lee and Makhija, 2009). The harsh realities of economic cycle effects

on innovations including IT and IT deployment in organizations have been proven in the past through reductions in IT project expenditures and abrupt postponement of ongoing IT projects during economic crises and recessions (Archibuigi et al; 2013).

Consequently, organizational heads of IT and IT project managers must plan for projects with quick payback time to their organizations and also quickly adjust their long-term strategies (Lee and Makhija, 2009 p.551) when the project completion schedule is lagging. This will prevent waste and economic loss to organizations due to the constant changes in IT and technology in general (Miller and Skinner, 2015).

In the next chapter, the national survey data from the Finnish barometer report will be analyzed to empirically find out how economic cycle affects IT and its deployment within organizations. The survey data analysis will help answer the research question “Are there interdependencies between IT and its deployment and economic cycles?”

## 3 RESEARCH PROCESS

### 3.1 Research methodology

This chapter discusses the research methodology which was used in analyzing the empirical data and answering the research question of this master thesis. The aim of the chapter is to find an answer to the research question: “Are there inter-dependencies between IT and its deployment and economic cycles?”. This chapter discusses the methodologies used and processes in carrying out this research. To start with, this chapter briefly explains the reasons why the quantitative method of research was used, and its suitability for this form of research.

Quantitative methodology is a form of research methodology that deals with systematic analysis of data. Quantitative research involves the calculation and the measuring of events and analyzing with the aid of statistical tools and a group of numerical data (Matveev, 2002). The assumption behind the quantitative methodology adherents is that there is an existing truth that can be measured; elucidated and quantified numerically and scientifically. The main pillars of belief of adherents of quantitative form of research are that numerical measurement is reliable, cogent and can be generalized in the foretelling of future events.

As a result of its deductive nature, quantitative methodology is based on the formulation of research hypotheses and the verification of the outcome of the research empirically on a stated form of data. Research hypotheses are free from the researcher’s own values, biases and prejudices. Additionally, a quantitative researcher can analyze a set of data without physically contacting the people from whom the data was obtained (Matveev, 2002).

The challenge with the quantitative methodology is that the data should be relevant to the topic under discussion or to be researched. For this research the data was received from a survey targeted to Finnish IT managers and the data illustrates their opinions which is analyzed exploratively.

Quantitative methodology as form of research method has the following strengths and advantages:

- Firstly, quantitative methodology enables the researcher to state the research problem specifically and then continue to set the terms of the research (Matveev, 2002).
- Secondly, the researcher is able to specify and mention the dependent and independent variables under investigation (Matveev, 2002).
- Thirdly, the researcher is able to follow consistently the original set of research goals, able to reach more objective conclusions, ability to test earlier hypotheses and establish factors that caused the statistical outcome (Larsson, 1993).

- Quantitative methodology enables high levels of reliability to be obtained due to the guarded observations, laboratory experiments, surveys and other forms of research.
- Quantitative methodology enables biases, subjectivity and other forms of judgment to be eliminated or minimized from the research process and outcome (Larsson, 1993).
- Again according to Larsson, 1993; quantitative methodology allows for longitudinal measures of subsequent performance of research subjects.
- The weaknesses of quantitative methodology as a research method are briefly discussed as follows:
  - Quantitative methodology fails to provide the researcher with information on the context of the situation where the data was gathered (Matveev, 2002).
  - Loss of control of the environment where the survey respondents provide the answers (Larsson, 1993).
  - The outcome of the research is normally limited and applicable to the prior set objectives and hypotheses (Larsson, 1993).
  - This form of research stymies continuous investigation of a research problem or a research phenomenon. This is because the data obtained is restricted to the purposes under which the researcher gathered the data (Larsson, 1993).

### **3.2 Data collection and analysis tools**

The data was gathered from a national online survey of managers of information technology (IT) and information technology (IT) services in organizations in Finland (IT Barometer). The IT barometer is an annual online web-survey of Finnish Data Processing Association (TIVIA) which is addressed to Finnish organizations with 500 or more employees and sometimes addressed to a sample of smaller organizations (Dahlberg, 2016). The barometer gathers the views and differences of opinions of business executives and IT managers about the utilization of IT and the expected changes in the future.

The survey was gathered in the year 2015. The respondents of the survey were asked to give their opinions about the economy and information technology (IT); and how information technology (IT) influence the operations of their organizations within the wider economic environment in which their organizations operate, and other specific questions about their organizations information technology (IT) projects.

The data was received in MS Excel format. The received data was then transferred to IBM SPSS 22.0 software for further statistical analysis. In SPSS 22.0 the data was coded and labeled, into different variables which was a challenging task. During the analysis the results were tested in a way that the reported answers were within the parameters of statistical analyses. The author chose to analyze the data by using the univariate analysis of

variance (ANOVA) in SPSS 22.0. The results of the data processed by SPSS 22.0 are explained in the next chapters.

### 3.3 The development of instruments

These were the methods adopted to make the data and the variables workable for this thesis. The splits or variable categories that were used for cross tabulations are:

Position: This was to ascertain the level of the respondents in the hierarchy of their respective organizations during the survey (1 - I work in IT, 2 = I work in business, 3 = I work as an expert, consult (similar), 88 = other) as can be seen in table 4.1 below.

Size of organization: This was to ascertain how big the various respondents' organizations were. (< 100 employees, 100-500 employees, > 500 employees) and Industry (Industry, Commerce, Services, Public sector) as can be seen in table 4.1 below.

In the survey data, all attitudinal questions required answers on a 7-point Likert scale ranging from -3 (strongly disagree) to 3 (strongly agree). Most of the agreement scales were recoded where -3 is 1 and +3 is 7. With tests of significance, test of difference was performed for means and proportions (with 0.05 alpha risks).

Correlation analysis was done using Pearson correlation (for second objective) and for the purpose of analysis of variance one-way ANOVA was used (for second objective).

Finally, paired T test was performed for questions related to *"Evaluate how the current economic situation will impact the behaviour of your organization"* and *"Evaluate also how the economic situation impacted the behaviour of your organization during the last year"*.

The answers given by the respondents to the survey were grouped with particular reference to the topic under research. The received data was clustered into different categories and segments. The clustering and categories are listed as follows:

- IT Managerial Practice
- Enterprise Architecture
- Targets set to IT
- IT Cost/ Factors impacting Development and Deployment
- IT Intangible Development

The responses from the received data were then paired against each other based on the above clusters using statistical software to gauge the suitability and measure possible outcomes.



## 4 EMPIRICAL RESULTS AND OBSERVATIONS

### 4.1 Respondents and their organizations

In the survey there were 249 respondents. From Table 4.1 below, most of the respondents were from the Services sector (49%) and companies with one hundred employees and below (51%). Regarding organizational position, 59% of respondents said they work in business positions, followed by those work in IT and IT experts (33%).

Index	Respondents and their organizations	Splits	Count	%
Q1	What is your organizational position?	1 = I work in IT	81	33
Q2		2 = I work in business	147	59
Q3		3 = I work as an expert, consult (similar)	30	12
Q4		88 = Other	6	2
Q5	What is the size of your organization measured with number of employees	1 = below 100 employees	127	51
		2 = 100 - 500 employees	84	34
		3 = over 500 employees	36	14
		99 = DK/Na	2	1
Q6	What is the industry of your organization	1 = Industry	67	27
		2 = Commerce	26	10
		3 = Services	123	49
		4 = Public sector	31	12
		99 = DK/Na	2	1

Table 4.1 Respondents and their organization

### 4.2 Economic situation and behavior of organizations and their IT management

The performance matrix illustrates economic situation and behaviour of organizations and their IT management (Figure 4.1 Performance matrix).

Two analyses were performed on questions related to influence of economic situation on the current behaviour and future business intention of organizations. Since the questions are on a 7-point agreement scales, benchmark in number four (4) is introduced for One-Sample Test where it is observed that in almost all variables, values are significantly higher than four (4) except in one variable ‘the objective of my organization is to postpone

IT purchases and IT investments. For the purpose of testing the difference (Paired Samples Test) between two sets of questions, the test results show higher future business intention in comparison with implementations in the previous year.

In addition to the above, and based on two set of questions regarding IT investment and development behaviour intentions and realized behaviour during economic cycle, it was observed that seven (7) business variables reported significantly higher values in comparison with the benchmark of four (4) that was set as seen in figure 4.1 below. This implies that these seven (7) variables will remain very important in the future as they were in the past.

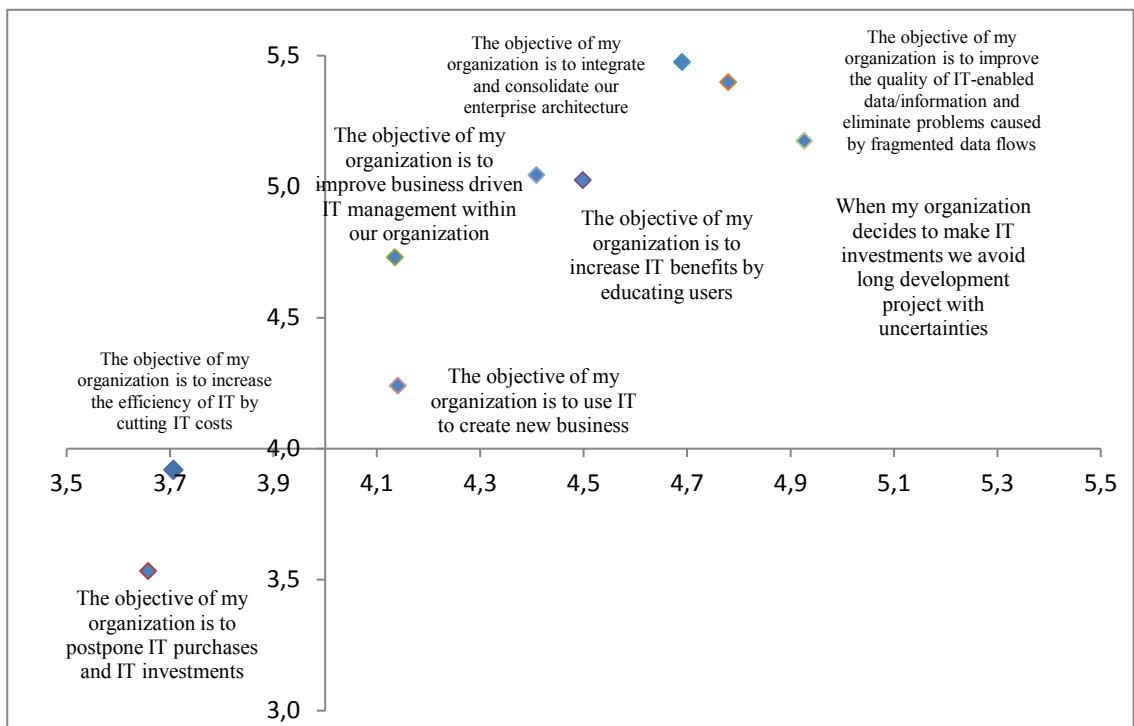


Figure 4.1 Performance Matrix

In table 4.2 the organizational objectives and IT management were compared. The first two propositions deal with cutting IT cost and postponing IT investments. The difference in the means of these proportions imply that IT management does not try to cut IT costs nor postpone IT investments against its organizational objectives. However, paired sample test reveals that there is no significant difference between organizational objective of postponing IT investment and IT management objective of postponing IT investments.

			Paired Samples Test	One-Sample Test		
	Mean		Mean	Sig. (2-tailed)	Sig. (2-tailed)	Sig. (2-tailed)
The objective of my organization is to increase the efficiency of IT by cutting IT costs	3.92	We increased the efficiency of IT by cutting IT costs	3.71	0.03	0.45	0.01
The objective of my organization is to postpone IT purchases and IT investments	3.53	We postponed IT purchases and IT investments	3.66	0.11	0.00	0.00
The objective of my organization is to use IT to create new business	4.73	We used IT to create new business	4.13	0.00	0.00	0.23
The objective of my organization is to increase IT benefits by educating users	5.02	We increased IT benefits by educating users	4.50	0.00	0.00	0.00
The objective of my organization is to improve the quality of IT-enabled data/information and eliminate problems caused by fragmented data flows	5.48	We improved the quality of IT-enabled data/information and eliminated problems caused by fragmented data flows	4.69	0.00	0.00	0.00
The objective of my organization is to integrate and consolidate our enterprise architecture	5.40	We integrated and consolidated our enterprise architecture	4.78	0.00	0.00	0.00
The objective of my organization is to improve business driven IT management within our organization	5.04	We improved business driven IT management within our organization	4.41	0.00	0.00	0.00
When my organization decided to make IT investments we require extremely short pay-back time	4.24	We required extremely short pay-back times from IT investments we made	4.14	0.06	0.01	0.16
When my organization decides to make IT investments we avoid long development project with uncertainties	5.17	We avoided long development project with uncertainties when my organization made IT investments	4.93	0.00	0.00	0.00
Overall mean	4.73		4.33			

Unit: mean, 95% confidence level (0.05 alpha risk)

Table 4.2 Comparing organizational objectives and IT management

Five propositions in the middle of the table 4.2 below were used to compare the value IT can bring to the organization. In each of the following variables, ‘*the objective of my organization is to create new business*’, ‘*the objective of my organization is to increase benefits by educating users*’, ‘*the objective of my organization is to improve the quality of IT-enabled data/information and eliminate problems caused by fragmented data flows*’, ‘*the objective of my organization is to integrate and consolidate our enterprise*

architecture’ and ‘the objective of my organization is to improve business driven IT management within our organization’, the results of organizational objectives were higher.

And in each of the results, the difference is statistically significant. The biggest difference between the organizational objectives and IT management is ‘the objective of my organization is to improve the quality of IT-enabled data/information and eliminate problems caused by fragmented data flows’ (5.48).

The two bottom propositions in Table 4.2, deal with IT investments. The overall highest score (5.17) among these opinions was given to the proposition “when my organization decides to make IT investment we avoid long development project with uncertainties”. The difference of the IT management in this case is also statistically significant although it is not high (0.24).

Another point of interest to the author was in how IT management’s opinion about IT investment is, regarding whether their organizations avoid long development project with uncertainties. Figure 4.2 illustrates replies to the question “When my organization decides to make IT investments we avoid long development project with uncertainties”. The variables in the Figure 4.2 are from left to right: (Total, I work in IT, I work in business, I work as an expert, Industry, Commerce, Services and Public sector). From the columns it can be seen that neutral attitudes (do not agree/disagree, do not know) related to organizational decisions about IT investments in order to avoid long development project with uncertainties were identified more among experts (31%) and the commerce sector (38%) than those who work in business (11%) and service sector (9%). Neutral opinions from the public sector (23%) were closer to expert and commerce sector (see Figure 4.2). However, 69% of the respondents totally agreed that their organizations try to avoid long development projects with uncertainties.

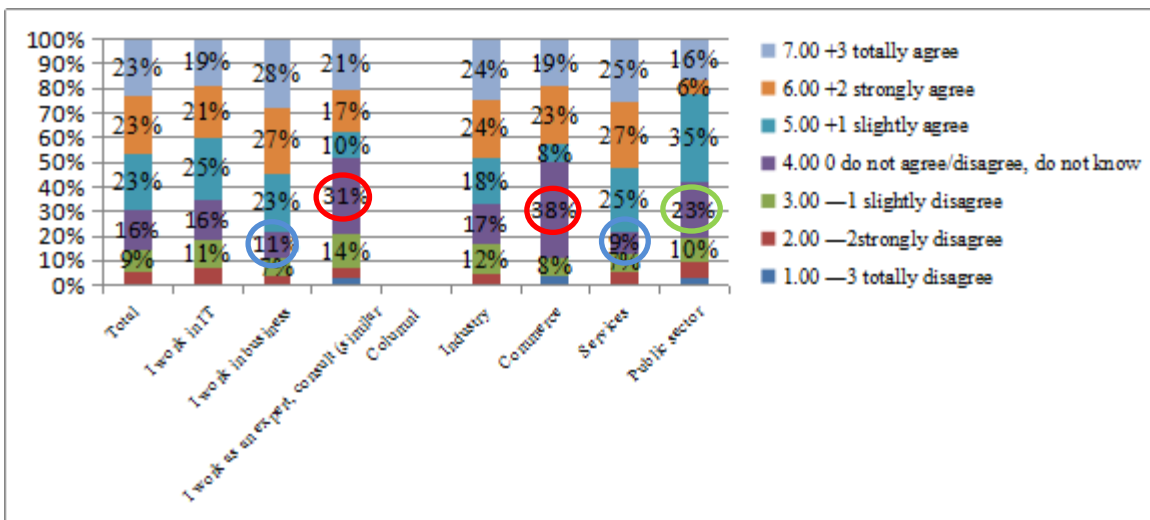


Figure 4.2: IT investments and avoidance of long development project with uncertainties  
 Test of proportion. Red circle are significantly higher than Blue Circle. Alpha risk 0.05%

In relation to future integration and consolidation issues, as reported in Figure 4.3 below (with the variables from left to right are: Total, I work in IT, I work in business, I work as an expert, organizations with below 100 employees, organizations with between 100-500 employees, organizations with over 500 employees, Industry, Commerce, Service and Public sector), strong disagreement is more to be identified among respondents who work as experts (10%), in comparison with those who work in business (1%), and small companies with below 100 employees (2%) and respondents representing companies with between 100-500 employees (2%), industry (2%) and the service sector (2%). On the other hand, total agreement can be found among respondents representing large companies in public sector (35%), organizations with over 500 employees (39%), which is closely followed by respondents who answered “I work in IT” (25%), “I work as an expert, consultant (24%), industry (23%) organizations with 100-500 employees (22%). However, respondents representing commerce (4%) were the least respondents to totally agree (Figure 4.3 below).

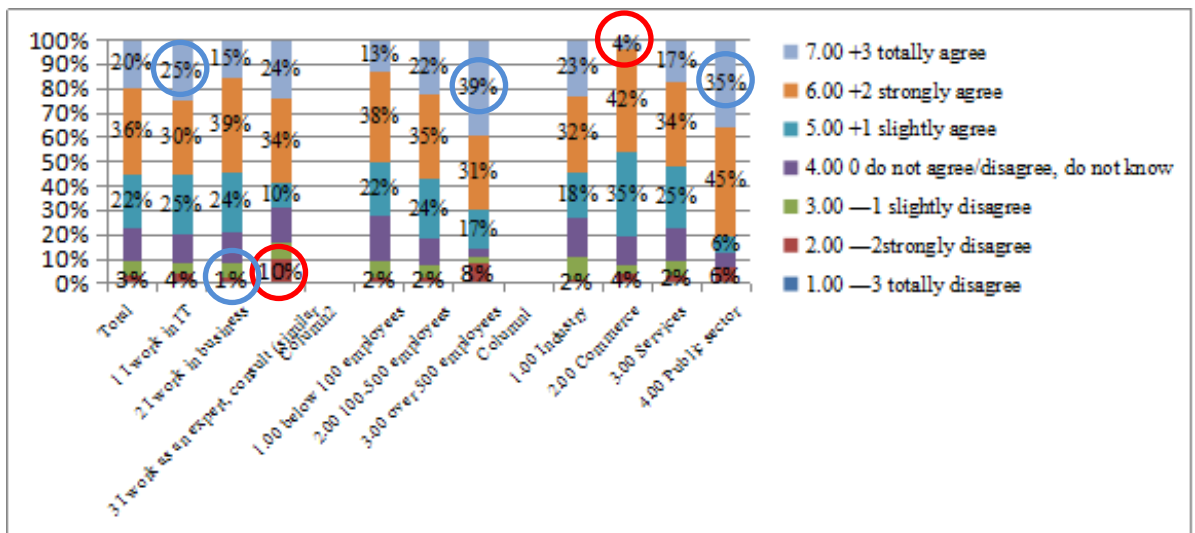


Figure 4.3 Future integration and consolidation issues  
 Test of proportion. Red circle are significantly higher than Blue Circle. Alpha risk 0.05%

### 4.3 The impact of current economic situation on organizational behavior

Earlier we analysed and compared organizational objectives and IT management. Now the focus is on how current economic situation will impact the behaviour of organization.

This is done through explorative correlation analysis. The analysis of evaluation of current economic situations is done using bivariate Pearson correlations. This method of analysis was used in order to identify drivers for each question related to this subject.

Only significant variables were selected and sorted from largest to smallest coefficient. The five (5) positively correlated variables are presented in the tables below. In the analyses of the tables I will concentrate on the highest correlation or on the interesting ones. By this explorative approach the aim is to find something new from the data which has been thoroughly analyzed by the owner of the data.

Increasing IT efficiency based in cuts of IT costs is positively correlated (0.23) to statements related to benefits and limitations of BYOD/IT consummation (see Table 4.3).

	Pearson Correlation	Corr. Coefficient*
Evaluate the following statements which describe the benefits and limitations of BYOD / IT consumerization	Allowing BYOD makes it more difficult to control It costs	0.23
Evaluate the following statements which describe the benefits and limitations of BYOD / IT consumerization	Allowing BYOD increases the need of It support	0.21
Evaluate IT outsourcing	The objective of my organization is to outsource as big part of IT activities as possible	0.208
Evaluate the following statements which describe the benefits and limitations of BYOD / IT consumerization	Allowing BYOD increases the fragmentation of architecture	0.189
Evaluate IT outsourcing	How big proportion approximately in percents of your organization's IT activities are outsourced	0.185

\*. Correlation is significant at the 0.01 and 0.05 level (2-tailed)

Table 4.3 Focus on items related to the organization's objective to increase the efficiency of IT by cutting costs

#### 4.4 The impact of BYOD on IT costs and investments

This analysis focus on the implications to organizations in allowing BYOD (Bring Your Own Device) by its staff and how it affects IT costs and investments. The point of interest is whether BYOD has positive net effect on IT investment needs of the organization.

This analysis is done through explorative correlation analysis. Allowing BYOD makes it more difficult to control IT costs is significantly correlated (0.154) to statements regarding benefits and limitations of BYOD/IT consumerization. This is found in Table 4.4 below.

	Pearson Correlation	Corr. Coefficient
Evaluate the following statements which describe the benefits and limitations of BYOD / IT consumerization	Allowing BYOD makes it more difficult to control It costs	0.154

\*. Correlation is significant at the 0.01 and 0.05 level (2-tailed).

Table 4.4 The impact of BYOD on IT costs and investments

## 4.5 IT capabilities to facilitate innovations and business value

This analysis focus on the capabilities of IT to facilitate new business development, innovations and efficiency of business processes by respondents.

First from the Table 4.5 below, the questions “evaluate IT’s capability to facilitate innovations and to add value to business” and “IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes” were paired. It was observed that the two were positively correlated (0.437).

Second from the Table 4.5, the questions “evaluate IT’s capability to facilitate innovations and to add value to business” and “it is extremely important to our future success that IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes in the future” were paired. It was observed that the two were highly correlated (0.434). This implies that from the results, there is a strong correlation between the capability of IT to facilitate innovations and the extreme importance of IT to the future success and efficiency of business processes.

Third from the Table 4.5, the questions “how important do you consider the following factors describing the business impact and deployment of IT for the success of your organization in the future” and new IT facilitated activities, which increase revenues” were paired. It was observed that the two are highly correlated (0.431). This implies that from the results, increased revenue generation is linked with IT deployment.

	Pearson Correlation	Corr. Coefficient
Evaluate IT's capability to facilitate innovations and to add value to business	IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes	0.437
Evaluate IT's capability to facilitate innovations and to add value to business	It is extremely important to our future success that IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes in the future	0.434
How important do you consider the following factors describing the business impact and deployment IT for the success of your organization in the future	New IT facilitated activities, which increase revenues	0.431
Evaluate IT's strategic management	It is extremely important to our future success that we manage IT and develop its management as a strategic asset in the future	0.34
How important do you consider the following factors describing the business impact and deployment IT for the success of your organization in the future	Increase in the volume of current business facilitated by IT	0.315

\*. Correlation is significant at the 0.01 and 0.05 level (2-tailed)

Table 4.5 The capabilities of IT to facilitate innovations and business value

Fourth from the Table 4.5, the questions “evaluate IT’s strategic management” and “it is extremely important to our future success that we manage IT and develop its management as a strategic asset in the future” were paired. It was observed that the two are highly correlated (0.34). This implies that from the results IT’s strategic management is extremely important in respondent’s opinion to the success of the organization’s future.

Last from the Table 4.5, the questions “how important do you consider the following factors describing the business impact and deployment IT for the success of your organization in the future” and “increase in the volume of current business facilitated by IT” were paired. It was observed that the two are highly correlated (0.315). This implies that from the results there is a strong correlation between increased volume of current business and deployment of IT for the success of the organization in the future.

Regarding creation of new business “IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes” is most influential component followed by “IT is extremely important to our future success that IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes in the future”.

## **4.6 The benefit of strategic management of IT in organizations**

This analysis focus on deriving benefits of IT and the strategic management of IT as a strategic asset and efficiently handling new innovations in organizations. This analysis further want to see whether there are correlations between IT and its strategic management of organizations. This analysis is done through explorative correlation analysis.

First from the Table 4.6, the questions “evaluate IT’s strategic management” and “we manage IT and develop its management as a strategic asset were paired together. It was observed from the results that the two are highly correlated (0.396). This implies that from the results, managing and developing IT as a strategic asset helps in IT’s strategic management.

Second from the Table 4.6, the questions “evaluate IT’s capability to facilitate innovations and to add value to business” and “IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes in the future” were paired together. It was observed from the results that the two are highly correlated (0.385). This implies that from the results, there is a strong correlation between the capability of IT to facilitate innovations and increasing efficiency of business processes.

Third from the Table 4.6, the questions “evaluate IT’s capability to facilitate innovations and to add value to business” and “it is extremely important to our future success that IT provides value to our business by facilitating the development of new innovations



and by increasing the efficiency of our business processes in the future” were paired together. It was observed from the results that the two are highly correlated (0.327). This implies that from the results, the capability of IT to facilitate innovations and the future efficiency of business processes are closely linked.

Fourth from the Table 4.6, the questions “evaluate how IT projects succeed in your organization and what characteristics they have” and “IT projects achieve the business objectives defined for them” were paired together. It was observed from the results that the two are highly correlated (0.323). This implies that from the results, there is a high correlation between defined objectives for IT and the success of IT projects in organizations.

Last on the Table 4.6, the questions “evaluate IT’s strategic management” and “It is extremely important to our future success that we manage IT and develop its management as a strategic asset in the future” were paired together. IT was observed from the results that the two are highly correlated (0.309). This implies that from the results, there is a strong correlation between IT’s strategic management and the future success of organizations.

In all respondents to the survey thought that increasing IT benefits can be mostly achieved by managing IT and develop its management as a strategic asset and efficiently handling new innovations.

	Pearson Correlation	Corr. Coefficient
Evaluate IT's strategic management	We manage IT and develop its management as a strategic asset	0.396
Evaluate IT's capability to facilitate innovations and to add value to business	IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes	0.385
Evaluate IT's capability to facilitate innovations and to add value to business	It is extremely important to our future success that IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes in the future	0.327
Evaluate how IT projects succeed in your organization and what characteristics they have	IT projects achieve the business objectives defined for them	0.323
Evaluate IT's strategic management	It is extremely important to our future success that we manage IT and develop its management as a strategic asset in the future	0.309

\*. Correlation is significant at the 0.01 and 0.05 level (2-tailed).

Table 4.6 The benefit of strategic management of IT in organizations

#### 4.7 Improvement of IT-enabled data/information and elimination of fragmented data flows

This analysis focus on the improvement of IT-enabled data/information and how problems caused by fragmented data flows are eliminated from organizations. This analysis is done through explorative correlation analysis.

First from the Table 4.7, the questions “evaluate IT’s capability to facilitate innovations and to add value to business” and IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes” were paired together. It was observed from the results that the two are highly correlated (0.484). This implies that from the results, there is a high correlation between IT’s capability to facilitate innovations and development of new innovations and increasing business processes.

Second from the Table 4.7, the questions “evaluate IT’s capability to facilitate innovations and to add value to business” and “It is extremely important to our future success that IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes in the future” were paired together. It was observed from the results that the two are highly correlated (0.477). This implies that from the results, there is a strong correlation between IT’s innovation capabilities and development of new innovations, increasing efficiency of future business processes.

	Pearson Correlation	Corr. Coefficient
Evaluate IT's capability to facilitate innovations and to add value to business	IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes	0.484
Evaluate IT's capability to facilitate innovations and to add value to business	It is extremely important to our future success that IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes in the future	0.477
Evaluate IT's strategic management	It is extremely important to our future success that we manage IT and develop its management as a strategic asset in the future	0.401
Evaluate how big is the proportion of IT costs from the revenues or the total budget of your organization	Percent (%) of revenues three years from now	0.387
Evaluate IT purchases	It is extremely important to the future success of my organization that In my organization the selection process of IT solutions works smoothly so that business needs are taken care of in IT purchases in the future	0.380

\* Correlation is significant at the 0.01 and 0.05 level (2-tailed).

Table 4.7 Improvement of IT-enabled data/information and elimination of fragmented data flows

Third from the Table 4.7, the questions “evaluate IT’s strategic management” and “It is extremely important to our future success that we manage IT and develop its management as a strategic asset in the future” were paired together. It was observed from the results that the two are highly correlated (0.401). This implies that from the results, there is a strong correlation between IT’s strategic management and future success of organizations.

Fourth from the Table 4.7, the questions “evaluate how big is the proportion of IT costs from the revenues or the total budget of your organization” and “Percent (%) of revenues three years from now” were paired together. It was observed from the results that the two are highly correlated (0.387). This implies that from the result, there is a strong correlation between proportion of IT costs and percent (%) of revenues from organizations budget three years from now.

Last from the Table 4.7, the questions “evaluate IT purchases” and “It is extremely important to the future success of my organization that in my organization the selection process of IT solutions works smoothly so that business needs are taken care of in IT purchases in the future” were paired together. It was observed from the results that the two are highly correlated (0.380). This implies that from the result, IT purchases and future success of organization through selection of process of IT solutions are strongly correlated.

Thus from the respondents, in order to improve the quality of IT-enabled data and avoid problems with data flows, companies must consider development of new innovations in their business process, and this can be done through increase of revenues during the next three years.

#### **4.8 Integration and consolidation of enterprise architecture of organization**

This analysis focus on the integration and consolidation of organizational enterprise architectures. The importance of the integration and consolidation of organizational enterprise architecture can be seen in the role it facilitates innovations and add value to businesses. This analysis was done through explorative correlation analysis.

First from the Table 4.8, the questions “evaluate IT’s capability to facilitate innovations and to add value to business” and “IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes” were paired together. It was observed from the results that the two are highly correlated (0.402). This implies that, from the results, there is a high correlation between IT’s capability to facilitate innovations and provision of value and increasing efficiency of business processes through IT.

Second from the Table 4.8, the questions “evaluate IT’s capability to facilitate innovations and to add value to business” and “it is extremely important to our future success that IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes in the future” were paired together. It was observed from the results that the two are highly correlated (0.348). This implies that from the results, there is a strong correlation between IT’s capability to facilitate innovations and business value addition and development of new innovations and future business process efficiency.

Third from the Table 4.8, the questions “evaluate IT’s strategic management” and “it is extremely important to our future success that we manage IT and develop its management as a strategic asset in the future” were paired together. It was observed from the results that the two are highly correlated (0.291). This implies that from the results, there is a strong correlation between strategic management of IT and future success of organizations that manage IT as a strategic asset.

Fourth from the Table 4.8, the questions “evaluate IT’s capability to facilitate innovations and to add value to business” and “on the basis of reliable metrics we know well what value IT provides to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes” were paired together. It was observed from the results that the two are highly correlated (0.243). This implies that from the results, there is a strong correlation between IT’s capability to facilitate innovations and business value addition and facilitation of new innovations and efficiency on the basis of reliable metrics.

	Pearson Correlation	Corr. Coefficient
Evaluate IT's capability to facilitate innovations and to add value to business	IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes	0.402
Evaluate IT's capability to facilitate innovations and to add value to business	It is extremely important to our future success that IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes in the future	0.348
Evaluate IT's strategic management	It is extremely important to our future success that we manage IT and develop its management as a strategic asset in the future	0.291
Evaluate IT's capability to facilitate innovations and to add value to business	On the basis of reliable metrics we know well what value IT provides to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes	0.243
Evaluate IT purchases	We define measurable objectives for IT purchases so that business needs are well taken care of	0.242

\*. Correlation is significant at the 0.01 and 0.05 level (2-tailed).

Table 4.8 The integration and consolidation of enterprise architecture of organization

Last from the Table 4.8, the questions “evaluate IT purchases” and “we define measurable objectives for IT purchases so that business needs are well taken care of” were paired together. It was observed from the results that the two are highly correlated (0.242). This implies that from the results, there is a strong correlation between IT purchases and definition of measurable objectives for IT purchases for business needs.

Thus from the analysis, integration and consolidation of enterprise architectures strongly depends on the capabilities of IT to facilitate innovations and to add value to business.

#### **4.9 The objective of improving business-driven IT**

This analysis focus on the objective of improving IT management through business-driven objectives as given by respondents to the survey. This analysis was done through explorative correlation analysis.

First from the Table 4.9, the questions “evaluate IT’s strategic management” and “it is extremely important to our future success that we manage IT and develop its management as a strategic asset in the future” were paired together. It was observed from the results that the two are highly correlated (0.489). This implies that from the results, there is a strong correlation between IT’s strategic management and future success of organizations that manage IT as a strategic asset.

Second from the Table 4.9, the questions “evaluate IT’s capability to facilitate innovations and to add value to business” and “IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes” were paired together. It was observed from the results that the two are highly correlated (0.481). This implies that from the results, there is a strong correlation between IT’s capability to facilitate innovations and facilitation of development of new innovations and business processes by IT.

Third from the Table 4.9, the questions “evaluate IT’s capability to facilitate innovations and to add value to business” and “it is extremely important to our future success that IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes in the future” were paired together. It was observed from the results that the two are highly correlated (0.433). This implies that from the results there is a strong correlation between IT’s capability to facilitate innovations and value provision of IT and development of new innovations and increased efficiency in the future.

Fourth from the Table 4.9, the questions “evaluate IT’s strategic management” and “we manage IT and develop its management as a strategic asset” were paired together. It was observed from the results that the two are highly correlated (0.408). This implies that

from the results there is a strong correlation between IT's strategic management and managing and development of IT as a strategic asset.

Last from the Table 4.9, the questions "evaluate IT's strategic management" and "we align the objectives of our IT activities with our business objectives so that we are able to evaluate how IT impacts the achievement of our business objectives" were paired together. It was observed from the results that the two are highly correlated (0.406). This implies that from the results, there is a strong correlation between IT's strategic management and IT business alignment and achievement of business objectives. Thus from the analysis, strategic management of IT facilitates the achievement of organizational objectives set for IT.

	Pearson Correlation	Corr. Coefficient
Evaluate IT's strategic management	It is extremely important to our future success that we manage IT and develop its management as a strategic asset in the future	0.489
Evaluate IT's capability to facilitate innovations and to add value to business	IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes	0.481
Evaluate IT's capability to facilitate innovations and to add value to business	It is extremely important to our future success that IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes in the future	0.433
Evaluate IT's strategic management	We manage IT and develop its management as a strategic asset	0.408
Evaluate IT's strategic management	We align the objectives of our IT activities with our business objectives so that we are able to evaluate how IT impacts the achievement of our business objectives	0.406

\*. Correlation is significant at the 0.01 level (2-tailed).

Table 4.9 The objective of improving business-driven IT.

#### 4.10 IT investments and payback period

This analysis focus on organizational IT investments and the payback period organizations mostly require from the projects. The analysis is based on answers respondents provided during a survey. This analysis was done through explorative correlation analysis.

First from the Table 4.10, the questions "evaluate how big is the proportion of IT costs from the revenues or the total budget of your organization" and "percent (%) of total budget now" were paired together. It was observed from the results that the two are highly correlated (0.451). This implies that from the results, there is a strong correlation between the proportion of IT costs from revenues and percent (%) of total budget now.

Second from the Table 4.10, the questions "evaluate how big is the proportion of IT costs from the revenues or the total budget of your organization" and "percent (%) of total budget three years from now" were paired together. It was observed from the results that

the two are highly correlated (0.354). This implies that from the results, there is a strong correlation between the proportions of IT costs from revenues and percent (%) of total budget three years from now.

Third from the Table 4.10, the questions “evaluate IT purchases” and “we define measurable objectives for IT purchases so that business needs are well taken care of” were paired together. It was observed from the results that the two are highly correlated (0.264). This implies that from the results, there is a strong correlation between organizational IT purchases and measurable objectives for IT purchases for business needs to be taken care of.

Fourth from the Table 4.10, the questions “evaluate IT purchases” and “after IT purchases we follow the achievement of the objectives defined for IT purchases” were paired together. It was observed from the results that, the two are correlated (0.21). This implies that from the results, there is correlation between organizational IT purchases and post-purchase objectives defined for IT.

	Pearson Correlation	Corr. Coefficient
Evaluate how big is the proportion of IT costs from the revenues or the total budget of your organization	Percent (%) of total budget now	0.451
Evaluate how big is the proportion of IT costs from the revenues or the total budget of your organization	Percent (%) of total budget three years from now	0.354
Evaluate IT purchases	We define measurable objectives for IT purchases so that business needs are well taken care of	0.264
Evaluate IT purchases	After IT purchases we follow the achievement of the objectives defined for IT purchases	0.21
Evaluate IT outsourcing	The objective of my organization is to outsource as big part of IT activities as possible	0.199

\*. Correlation is significant at the 0.01 and 0.05 level (2-tailed)

Table 4.10 IT investments and payback period

Last from the Table 4.10, the questions “evaluate IT outsourcing” and “the objective of my organization is to outsource as big part of IT activities as possible” were paired together. It was observed from the results that the two are correlated (0.199). This implies that from the results, IT outsourcing and organizational objective of outsourcing a big part of IT activities are correlated.

Thus, predictably IT costs strongly correlate with short payback time in lieu with IT purchases from the analysis. Most respondents to the survey opined that when deciding IT purchases the prefer projects with short payback time.

#### 4.11 Organizational IT investment and projects with uncertainties

This analysis focus on organizational IT investments and projects with uncertainties. The analysis is based on answers respondents provided during the survey. This analysis was done through explorative correlation analysis.

First from the Table 4.11, the questions “evaluate how well the following cloud services related statements describe your organization” and “if we would want to do so we could easily transfer our current IT services to cloud services” were paired together. It was observed from the results that the two are correlated (0.228). This implies that from the results, there is correlation between cloud services desire and how easily organizations could transfer their current IT services.

Second from the Table 4.11, the questions “evaluate IT purchases” and “after IT purchases we follow the achievement of the objectives defined for IT purchases” were paired together. It was observed from the results that the two are correlated (0.224). This implies that from the results, there is correlation between IT purchases and post-purchase objectives defined for IT.

Third from the Table 4.11, the questions “evaluate the following statements which describe the benefits and limitations of BYOD/IT consumerization” and “allowing BYOD increases work productivity” were paired together. It was observed from the results that the two are correlated (0.187). This implies that from the results, there is correlation between BYOD and increases in work productivity.

	Pearson Correlation	Corr. Coefficient
Evaluate how well the following cloud services related statements describe your organization	If we would want to do so we could easily transfer our current It services to cloud services	0.228
Evaluate IT purchases	After IT purchases we follow the achievement of the objectives defined for IT purchases	0.224
Evaluate the following statements which describe the benefits and limitations of BYOD / IT consumerization	Allowing BYOD increases work productivity	0.187
Evaluate IT's capability to facilitate innovations and to add value to business	On the basis of reliable metrics we know well what value IT provides to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes	0.184
Evaluate IT purchases	We define measurable objectives for IT purchases so that business needs are well taken care of	0.175

\*. Correlation is significant at the 0.01 and 0.05 level (2-tailed)

Table 4.11 Organizational IT investment and projects with uncertainties

Fourth from the Table 4.11, the questions “evaluate IT’s capability to facilitate innovations and to add value to business” and “on the basis of reliable metrics we know well what value IT provides to our business by facilitating the development of new innovations



and by increasing the efficiency of our business processes” were paired together. It was observed from the results that the two are correlated (0.184). This implies that from the results, there is correlation between IT’s capability to facilitate innovations and increasing of efficiency based on reliable metrics.

Last from the Table 4.11, the questions “evaluate IT purchases” and “we define measurable objectives for IT purchases so that business needs are well taken care of” were paired together. It was observed from the results that the two are correlated (0.175). This implies that from the results, there is correlation between organizational IT purchases and definition of measurable objectives for IT purchases for business needs to be well taken care of.

Thus in summary, regarding IT investment and development of long uncertain projects, cloud services appear as main choice. Next two important factors are: “After IT purchases we follow the achievement of the objectives defined for IT purchases” and “Allowing BYOD increases work productivity”.

#### **4.12 The impact of economic situation on the behaviour of organizations during the last year**

The influences on organizational behavior based on economic situations during the last year were tested using One-way univariate analysis (ANOVA), where each question from the nine designated questions from the research problem were matched against the rest of the questionnaire excluding open ended and multiple response questions. The received outputs are sorted in descending order by their F value for purposes of identification of main influencers to tested variable.

A one way ANOVA was performed to compare the average variations between the variables on Table 4.12. The variables were divided into three sub-categories based on IT strategic management, IT purchases and BYOD and IT risks and deployment. In the first three variables of the Table 4.12, involving “evaluate IT’s strategic management” and “manage IT and develop its management as a strategic asset”, “evaluate IT outsourcing” and “we have defined clear business and/or other objectives for IT outsourcing” and “evaluate how IT projects succeed in your organization and what characteristics they have” and “IT projects achieve the business objectives defined for them”, the outcome variable was found to be normally distributed (mean square= 12,9, and 8 respectively; F= 4,3,3 respectively). The magnitude of the difference in the means and the size was very small, .01.

	ANOVA	Sum of Squares	df	Mean Square	F	Sig.
Evaluate IT's strategic management	We manage IT and develop its management as a strategic asset	71	6	12	4	0.00
Evaluate IT outsourcing	We have defined clear business and/or other objectives for IT outsourcing	55	6	9	3	0.01
Evaluate how IT projects succeed in your organization and what characteristics they have	IT projects achieve the business objectives defined for them	49	6	8	3	0.01
Evaluate how well the following data management related statements describe your organization	My organization has a clear strategy and implementation plan on how to deploy big data in business	42	6	7	2	0.03
Evaluate how well the following BYOD / IT consumerization related statements describe your organization	The goal of my organization is to enable the use of same applications and services at work and at leisure time	39	6	7	2	0.04
Evaluate how well the following cloud services related statements describe your organization	The deployment of cloud services will make cost savings possible	39	6	7	2	0.04
Evaluate IT purchases	The competence of my organization to make IT purchases corresponds with the business needs of my organization	38	6	6	2	0.05
How important do you consider the following factors describing the business impact and deployment IT for the success of your organization in the future	Good mitigation of business impacting IT-risks	33	5	7	2	0.06
Evaluate IT purchases	My organization has funds available to purchase new It solutions	37	6	6	2	0.06
How important do you consider the following factors describing the business impact and deployment IT for the success of your organization in the future	New IT facilitated activities, which increase revenues	35	6	6	2	0.07

\*. F values are significant at the < 0.1 level

Table 4.12 Increasing the efficiency of IT by cutting IT costs

The second four variables in Table 4.12, involving “evaluate how well the following data management related statements describe your organization” and “my organization has a clear strategy and implementation plan on how to deploy big data in business”, and “evaluate how well the following BYOD/IT consumerization related statements describe your organization” and “the goal of my organization is to enable the use of same applications and services at work and at leisure time” and “evaluate how well the following cloud services related statements describe your organization” and “the deployment of cloud services will make cost savings possible” and “evaluate IT purchases” and “the competence

of my organization to make IT purchases corresponds with the business needs of my organization”, the outcome variable was found to be normally distributed (mean square = 7,7,7,6 respectively). The magnitude of difference in means and size was very small, .03, .04, .04, .05 respectively.

The last three variables in Table 4.12 involving “how important do you consider the following factors describing the business impact and deployment of IT for the success of your organization in the future” and “good mitigation of business impacting IT-risks”, and “evaluate IT purchases” and “my organization has funds available to purchase new IT solutions”, and “how important do you consider the following factors describing the business impact and deployment of IT for the success of your organization in the future” and “new IT facilitated activities which increase revenues”, the outcome variable was found to be normally distributed (mean square=7,6,6 respectively, F=2,2,2 respectively) The magnitude of difference in means and size was very small, .06,.06, .07 respectively.

Management and development of IT as strategic assets and the presence of clear business objectives for IT sourcing are the two main factors determining the importance of increasing the efficiency of IT by cutting IT costs. There should be notice that F values are not so high, below four (4) beside their significance.

	ANOVA	Sum of Squares	df	Mean Square	F	Sig.
Evaluate IT purchases	My organization has funds available to purchase new It solutions	147	6	24	9	0.001
Evaluate IT purchases	My organization has funds available to to renew old IT solutions	135	6	23	8	0.001
Evaluate IT's strategic management	We manage IT and develop its management as a strategic asset	129	6	22	7	0.001
Evaluate how well do the statement below describe your organization	In my organization, business strategy, business models, operative model and IT architecture establish a well integrated whole	102	6	17	6	0.001
Evaluate IT outsourcing	My organization has a clear strategy and action plan for IT outsourcing	100	6	17	6	0.001
Evaluate IT purchases	The competence of my organization to make IT purchases corresponds with the business needs of my organization	89	6	15	5	0.001
Evaluate how well do the statement below describe your organization	In my organizations IT infrastructure, applications, data and processes establish a well integrated whole	84	6	14	4	0.001
Evaluate how IT projects succeed in your organization and what characteristics they have	IT projects achieve the business objectives defined for them	79	6	13	4	0.001
Evaluate how well do the statement below describe your organization	In my organization, we develop systematically IT and IT management competencies needed to execute our business	77	6	13	4	0.001
Evaluate IT outsourcing	My organization has a clear IT services purchasing strategy and action plan for IT resources and services purchasing	75	6	12	4	0.001

\*. F values are significant at the < 0.1 level

Table 4.13 Postponing IT purchases and IT investments

A one way ANOVA was performed to compare the average variations between the variables on Table 4.13. The variables were grouped based on organizational IT purchases, strategic management of IT and IT outsourcing. The outcome variable was found to be normally distributed (mean square ranges between 24 and 12 respectively, (F) between 9 and 4 respectively). The magnitude difference in means and size was very small (.001) consecutively.

	ANOVA	Sum of Squares	df	Mean Square	F	Sig.
Evaluate how well do the statement below describe your organization	In my organization, we develop systematically IT and IT management competencies needed to execute our business	162.9	6	27.2	11.0	0.001
Evaluate IT's strategic management	We manage IT and develop its management as a strategic asset	132.5	6	22.1	8.6	0.001
Evaluate IT's capability to facilitate innovations and to add value to business	On the basis of reliable metrics we know well what value IT provides to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes	133.3	6	22.2	8.5	0.001
Evaluate IT's strategic management	Based on reliable metrics we know well the benefits of IT management and its development as a strategic asset	131.3	6	21.9	8.5	0.001
Evaluate how well do the statement below describe your organization	We know well the impact of IT on our business	121.3	6	20.2	7.7	0.001
Evaluate IT's capability to facilitate innovations and to add value to business	IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes	122.8	6	20.5	7.7	0.001
Evaluate IT's strategic management	We align the objectives of our IT activities with our business objectives so that we are able to evaluate how IT impacts the achievement of our business objectives	119.6	6	19.9	7.6	0.001
Evaluate how IT projects succeed in your organization and what characteristics they have	IT projects are actually business development projects	118.1	6	19.7	7.5	0.001
Evaluate how well do the statement below describe your organization	IT serves our business as a partner in the pursuing of strategic objectives	116.9	6	19.5	7.3	0.001
Evaluate how well do the statement below describe your organization	In my organization, business strategy, business models, operative model and IT architecture establish a well integrated whole	109.6	6	18.3	6.8	0.001

\*. F values are significant at the < 0.1 level

Table 4.14 Use of IT to create new business.

Postponing IT purchases and IT investment are linked to availability of fund for purchasing new IT solutions (F-value: 9) and renewal of old IT solutions (F-value: 8). Managing and developing IT as strategic assets and “In my organization, business strategy, business models, operative model and IT architecture establish a well-integrated whole” must be considered as important factors.

A one way ANOVA was performed to compare the average variations between the variables on Table 4.14. The variables were grouped based on IT strategic management, IT and business creation and IT and innovation. The outcome variable was found to be normally distributed (mean square ranges between 27.2 and 18.3 respectively, (F) between 11.0 and 6.8) respectively. The magnitude difference in means and size was very small (.001) consecutively.

	ANOVA	Sum of Squares	df	Mean Square	F	Sig.
Evaluate how well do the statement below describe your organization	In my organization, we develop systematically IT and IT management competencies needed to execute our business	105.7	6	17.6	10.6	0.001
Evaluate how IT projects succeed in your organization and what characteristics they have	IT projects achieve the business objectives defined for them	77.4	6	12.9	7.4	0.001
Evaluate IT's strategic management	We manage IT and develop its management as a strategic asset	71.5	6	11.9	6.8	0.001
Evaluate IT's capability to facilitate innovations and to add value to business	IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes	71.1	6	11.8	6.5	0.001
Evaluate IT's capability to facilitate innovations and to add value to business	On the basis of reliable metrics we know well what value IT provides to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes	69.9	6	11.6	6.4	0.001
Evaluate how well do the statement below describe your organization	In my organization, business strategy, business models, operative model and IT architecture establish a well integrated whole	61.7	6	10.3	5.6	0.001
Evaluate IT outsourcing	My organization has a clear IT services purchasing strategy and action plan for IT resources and services purchasing	58.3	6	9.7	5.4	0.001
Evaluate IT's strategic management	Senior executives, business unit executives and IT executives share the accountabilities and responsibilities of IT management on the basis of clearly defined governance arrangement	58.2	6	9.7	5.3	0.001
Evaluate IT purchases	The competence of my organization to make IT purchases corresponds with the business needs of my organization	57.6	6	9.6	5.3	0.001
Evaluate how well do the statement below describe your organization	In my organizations IT infrastructure, applications, data and processes establish a well integrated whole	58.2	6	9.7	5.2	0.001

\*. F values are significant at the < 0.1 level

Table 4.15 Increasing IT benefits by educating users

When the variable “In my organization, we develop systematically IT and IT management competencies needed to execute our business” was considered, it was the only variable with the highest (F) value of 11.0.

A one way ANOVA was performed to compare the average variations between the variables on Table 4.15. The variables were grouped based on IT and organizational factors like “Evaluate how well do the statement below describe your organization”, IT strategic management and IT purchases. The outcome variable was found to be normally distributed as can be observed from the table 4.15 above (mean square ranges between 17.6 and 9.7 respectively, (F) ranges between 10.6 and 5.2) respectively. The magnitude difference in means and size was very small (.001) consecutively.

	ANOVA	Sum of Squares	df	Mean Square	F	Sig.
Does your organization use the following best practice / IT governance methods	ITIL	39.2	2	19.6	12.2	0.001
Evaluate how IT projects succeed in your organization and what characteristics they have	Prior to the start of IT projects we think carefully what are their impacts on our activities and on key stakeholders	80.0	6	13.3	9.1	0.001
Evaluate how well do the statement below describe your organization	In my organization, we develop systematically IT and IT management competencies needed to execute our business	81.5	6	13.6	8.9	0.001
Evaluate IT purchases	In my organization the selection process of IT solutions works smoothly so that business needs are taken care of in IT purchases	78.4	6	13.1	8.9	0.001
Evaluate how well do the statement below describe your organization	In my organization, business strategy, business models, operative model and IT architecture establish a well integrated whole	78.6	6	13.1	8.6	0.001
Evaluate how IT projects succeed in your organization and what characteristics they have	IT projects achieve the business objectives defined for them	71.2	6	11.9	7.9	0.001
Evaluate IT's strategic management	We manage IT and develop its management as a strategic asset	70.7	6	11.8	7.9	0.001
Evaluate IT outsourcing	My organization has a clear IT services purchasing strategy and action plan for IT resources and services purchasing	66.2	6	11.0	7.3	0.001
Evaluate how IT projects succeed in your organization and what characteristics they have	The competence of my organization to manage IT projects correspond with the business need of my organization	65.2	6	10.9	7.2	0.001
Evaluate IT purchases	After IT purchases we follow the achievement of the objectives defined for IT purchases	65.2	6	10.9	7.1	0.001

\*. F values are significant at the < 0.1 level

Table 4.16 Improving the quality of IT-enabled data/information and eliminating problems caused by fragmented data flows.

In order to increase IT benefit by educating users, companies develop systematically IT and IT management competencies needed to execute their business. In addition they manage IT and develop its management as a strategic asset.

A one way ANOVA was performed to compare the average variations between the variables on Table 4.16 below. The variables were grouped based on IT governance methods, IT strategic management, IT outsourcing and IT purchases. The outcome variable was found to be normally distributed (mean square ranges between 19.6 and 10.99 respectively, (F) ranges between 12.2 and 7.1 respectively). The magnitude difference in means and size was very small (.001) consecutively. The assessment of the responses to “Quality of IT-enabled data/information are based on following ITIL method” and focusing on impacts of IT projects on firm activities and on key stakeholders are found in the table 4.16 above.

	ANOVA	Sum of Squares	df	Mean Square	F	Sig.
Evaluate IT's strategic management	We manage IT and develop its management as a strategic asset	95.4	6	15.9	11.3	0.001
Evaluate IT purchases	The competence of my organization to make IT purchases corresponds with the business needs of my organization	93.3	6	15.6	11.0	0.001
Evaluate IT purchases	After IT purchases we follow the achievement of the objectives defined for IT purchases	83.0	6	13.8	9.5	0.001
Evaluate how IT projects succeed in your organization and what characteristics they have	The competence of my organization to manage IT projects correspond with the business need of my organization	82.2	6	13.7	9.4	0.001
Evaluate how well do the statement below describe your organization	In my organization, we develop systematically IT and IT management competencies needed to execute our business	81.1	6	13.5	8.8	0.001
Evaluate how IT projects succeed in your organization and what characteristics they have	Prior to the start of IT projects we think carefully what are their impacts on our activities and on key stakeholders	77.1	6	12.8	8.6	0.001
Evaluate IT's strategic management	Senior executives, business unit executives and IT executives share the accountabilities and responsibilities of IT management on the basis of clearly defined governance arrangement	74.7	6	12.5	8.3	0.001
Evaluate how well do the statement below describe your organization	In my organization, business strategy, business models, operative model and IT architecture establish a well integrated whole	73.8	6	12.3	7.9	0.001
Evaluate IT's strategic management	Based on reliable metrics we know well the benefits of IT management and its development as a strategic asset	67.2	6	11.2	7.3	0.001
Evaluate IT's capability to facilitate innovations and to add value to business	IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes	68.5	6	11.4	7.3	0.001

\*. F values are significant at the < 0.1 level

Table 4.17 Integrating and consolidating enterprise architecture



A one way ANOVA was performed to compare the average variations between the variables on table 4.17. The variables were grouped based on IT strategic management, IT purchases and other organizational metrics like “In my organization, business strategy, business models, operative model and IT architecture establish a well-integrated whole”.

The outcome variable was found to be normally distributed (mean square ranges between 15.9 and 11.4 respectively, (F) ranges between 11.3 and 7.3 respectively). The magnitude difference in means and size was very small (.001) consecutively.

Thus, it was found out that integration and consolidation of companies’ architecture are strongly dependent on handling IT management as strategic asset and balance between business needs and for IT purchases.

	ANOVA	Sum of Squares	df	Mean Square	F	Sig.
Evaluate IT's strategic management	We manage IT and develop its management as a strategic asset	155.2	6	25.9	19.5	0.001
Evaluate IT's strategic management	Based on reliable metrics we know well the benefits of IT management and its development as a strategic asset	147.6	6	24.6	18.1	0.001
Evaluate how well do the statement below describe your organization	In my organization, we develop systematically IT and IT management competencies needed to execute our business	142.8	6	23.8	16.7	0.001
Evaluate IT's strategic management	Senior executives, business unit executives and IT executives share the accountabilities and responsibilities of IT management on the basis of clearly defined governance arrangement	130.9	6	21.8	15.2	0.001
Evaluate IT's capability to facilitate innovations and to add value to business	On the basis of reliable metrics we know well what value IT provides to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes	123.4	6	20.6	13.6	0.001
Evaluate how well do the statement below describe your organization	In my organization, business strategy, business models, operative model and IT architecture establish a well integrated whole	116.1	6	19.3	12.5	0.001
Evaluate how IT projects succeed in your organization and what characteristics they have	The competence of my organization to manage IT projects correspond with the business need of my organization	108.3	6	18.0	11.8	0.001
Evaluate IT purchases	We define measurable objectives for IT purchases so that business needs are well taken care of	102.3	6	17.1	11.0	0.001
Evaluate how IT projects succeed in your organization and what characteristics they have	IT projects achieve the business objectives defined for them	101.2	6	16.9	10.8	0.001
Evaluate IT purchases	The competence of my organization to make IT purchases corresponds with the business needs of my organization	95.3	6	15.9	10.0	0.001

\*. F values are significant at the < 0.1 level

Table 4.18 Improving business driven IT management within the organization



A one way ANOVA was performed to compare the average variations between the variables on table 4.18. The variables were grouped based on IT strategic management, IT purchases and IT-enabled innovations. The outcome variable was found to be normally distributed (mean square ranges between 25.9 and 15.9 respectively (F) ranges between 19.5 and 10.0) respectively. The magnitude difference in means and size was very small (.001) consecutively.

Improvements of business driven IT management are more related to “We manage IT and develop its management as a strategic asset” (F-value: 19.5), “Based on reliable metrics we know well the benefits of IT management and its development as a strategic asset” (F-value: 18.1) and “In my organization, we develop systematically IT and IT management competencies needed to execute our business” (F-value: 16.7), in comparison with other variables.

A one way ANOVA was performed to compare the average variations between the variables on table 4.19 below. The variables were grouped based on IT outsourcing, IT purchases and BYOD/IT consumerization. The outcome variable was found to be normally distributed (mean square ranges between 10.3 and 5.0 respectively, (F) ranges between 4.8 and 2.2 respectively). The magnitude difference in means and size was very small with ranges between (0 and .044) respectively.

Expectation of extreme short pay-back investment decision is more connected to the statements such as “The management of IT and business continuity risks corresponds with the business needs of my organization” and “We define measurable objectives for IT purchases so that business needs are well taken care of”, than other questions that was analyzed.

A one way ANOVA was performed to compare the average variations between the variables on table 4.20 below. The variables were grouped based on IT investments, IT outsourcing, IT purchases, IT project management and BYOD. The outcome variable was found to be normally distributed (mean square ranges between 8.0 and 5.8 respectively, (F) ranges between 3.3 and 2.3 respectively). The magnitude difference in means and size was very small (.004 and .034) respectively.

Regarding company attitudes toward high risk and long term projects respondents stated more that if they would want to do so they could easily transfer current IT services to cloud services. Other important issues are “The deployment of IT is one of the factors that will impact most on the future success of organizations” and “The competence of my organization to manage IT projects correspond with the business need of my organization”.

	ANOVA	Sum of Squares	df	Mean Square	F	Sig.
Evaluate how well the following IT-risk management related statements describe your organization	The management of IT and business continuity risks corresponds with the business needs of my organization	62.0	6	10.3	4.8	0
Evaluate IT purchases	We define measurable objectives for IT purchases so that business needs are well taken care of	56.1	6	9.4	4.2	0.001
How important do you consider the following factors describing the business impact and deployment IT for the success of your organization in the future	Increase in the volume of current business facilitated by IT	39.8	6	6.6	2.9	0.009
Evaluate the following statements which describe the benefits and limitations of BYOD / IT consumerization	Allowing BYOD promotes the use of innovative work practices	37.9	6	6.3	2.8	0.012
Evaluate IT outsourcing	The objective of my organization is to outsource as big part of IT activities as possible	39.7	6	6.6	2.8	0.012
Evaluate the following statements which describe the benefits and limitations of BYOD / IT consumerization	Allowing BYOD increases motivation to work	37.5	6	6.2	2.8	0.012
Evaluate how well the following cloud services related statements describe your organization	The deployment of cloud services will make cost savings possible	36.3	6	6.0	2.6	0.017
Evaluate IT's capability to facilitate innovations and to add value to business	On the basis of reliable metrics we know well what value IT provides to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes	36.1	6	6.0	2.6	0.019
Evaluate IT purchases	My organization has funds available to to renew old IT solutions	33.9	6	5.6	2.4	0.028
Evaluate the following statements which describe the benefits and limitations of BYOD / IT consumerization	Allowing BYOD produces costs savings	30.0	6	5.0	2.2	0.044

\*. F values are significant at the < 0.1 level

Table 4.19 . The required pay-back times from IT investments we mad

	ANOVA	Sum of Squares	df	Mean Square	F	Sig.
Evaluate how well the following cloud services related statements describe your organization	If we would want to do so we could easily transfer our current It services to cloud services	47.7	6	8.0	3.3	0.004
Evaluate yourself as the respondent to the survey	The deployment of IT is one of the factors that will impact most on the future success of organizations	44.3	6	7.4	2.9	0.009
Evaluate how IT projects succeed in your organization and what characteristics they have	The competence of my organization to manage IT projects correspond with the business need of my organization	39.8	6	6.6	2.7	0.015
Evaluate IT purchases	After IT purchases we follow the achievement of the objectives defined for IT purchases	39.0	6	6.5	2.6	0.017
Evaluate how IT projects succeed in your organization and what characteristics they have	Prior to the start of IT projects we think carefully what are their impacts on our activities and on key stakeholders	38.1	6	6.3	2.6	0.019
Evaluate the following statements which describe the benefits and limitations of BYOD / IT consumerization	Allowing BYOD increases motivation to work	38.3	6	6.4	2.6	0.02
Evaluate the following statements which describe the benefits and limitations of BYOD / IT consumerization	Allowing BYOD increases information security risks	37.1	6	6.2	2.5	0.024
Evaluate IT outsourcing	We know well the results of IT outsourcing in comparison the objectives defined for IT outsourcing based on reliable measures	35.5	6	5.9	2.4	0.03
Evaluate IT purchases	We define measurable objectives for IT purchases so that business needs are well taken care of	34.6	6	5.8	2.3	0.033
Evaluate the following statements which describe the benefits and limitations of BYOD / IT consumerization	Allowing BYOD produces costs savings	34.8	6	5.8	2.3	0.034

\*. F values are signifct at the < 0.1 level

Table 4.20 Avoiding long development project with uncertainties when organization is making IT investments

### **4.13 Research limitations**

In our research there are several validity and reliability challenges. Where we have been able to build an instrument which measures, what it is intended to measure? And whether results produced are reliable and consistent, when repeated measurements are made.

The data for the study was received from a national survey done in Finland and it was in Finnish language. There is always a possibility of mistakes in translations or in interpretations of the data.

The approach of the study was explorative, this kind of approach is challenging and vulnerable for misinterpretations. In a survey one can never make wide questions. However, we have tried to be open-minded and have tried to build something new.

## **5 CONCLUSIONS**

### **5.1 Summary conclusions**

This master thesis aimed to find out by literature review the interrelations between economic cycles and information technology (IT) stages and deployment. In furtherance of this aim, an explorative survey analysis of the opinions of IT managers in Finland about how the economic environment influences IT management and deployment was analyzed.

By identifying recent economic cycles and IT infrastructure cycles literature, some interrelations was observed. The effects of economic cycle on IT and IT deployment in organizations is difficult to prove although there has been some obvious reductions in IT project expenditures and in some circumstances an abrupt postponement of ongoing IT projects during recessions.

The empirical result of this study is based on the opinions of 249 IT managers. The quantitative evaluation of IT managers' opinions was explorative in order to find something new and interesting. First, there was an evaluation in a performance matrix on how organizational objectives including IT are affected by the economic situation. Some effects were noticed in this population, but they were not statistically significant differences. Therefore an explorative analysis of factors affecting different key phenomena of IT management and deployment were made. In the analysis, it was observed that IT manager's opinions seems to be most homogenous in the following variables: 1) Trying to increase efficiency of IT by cutting down IT costs, 2) Postponing IT purchases and investments, 3) Requiring extremely short pay-back times from IT investments.

The explanation for the homogeneity in financial items might be because of the pace of change and invention in the field of IT. As a result of the rapid pace of change in IT, organizations need to always keep up with budgets and investment into IT to derive the full benefits from IT. To be able to stay ahead of economic cycle changes, IT managers in particular and managers in general should continually scan the business environment for signals of economic cycle changes and subsequently implement programs and policies to effectively mitigate the effects of economic cycle changes on their businesses.

### **5.2 General conclusions**

In conclusion economic cycle is volatile and unpredictable and has wide implications on the survival of organizations (Fornari and Mele, 2013). As a result of this business managers and planners of the future of organizations should stay abreast of developments in the wider economic environment with the aim of identifying trends of cycle change. This

action will enable business entities and their managers to be adequately prepared for adverse economic cycle changes when they should occur.

Secondly, the importance of IT and IT solutions to businesses in today's technologically advanced and globally intertwined business environment cannot be underestimated. The level of dependence on IT and IT solutions by organizations keep increasing, the same is the level of innovation in the field of IT. This therefore requires constant investments into IT in order to derive the benefits that accrue to organizations from their investment into IT (Dahlberg, et al; 2015).

Business managers and supervisory boards of businesses should constantly monitor the wider economic environment for signals of economic cycle changes. This can be done through monitoring quarterly forecasts of state of the economy presented by ministries, departments and agencies of government, central banks, industry unions, and other research institutions. These bulletins and forecasts issued by these research institutions should be studied and adequately analyzed to aid in the preparedness of organizations to economic cycle changes (Holmström and Tirole, 1993).

Furthermore, organizations should endeavor to stick to planned IT investments and deployment of IT schedules during economic cycle changes. The ability to stick to planned IT projects during economic cycle changes enable the organization's IT adoption and deployment to be on schedule. This enables the organization to build on its IT assets. The organization is further able to withstand the negative effects of the economic cycle and thereby grow during stable economic environments (Dahlberg, et al; 2017).

Finally, organizations and their IT function should be integrated for optimum results (Dahlberg and Helin, 2017). The management of IT within organizations should be knowledgeable about the strategies and the mission statements of their organizations. This will enable IT to act as a catalyst in the organization rather than as a department within the organization. With IT as a catalyst, organizations will be able to innovate and better mitigate the negative effects of economic cycle on their operations.

### **5.3 Future research possibilities**

In future industry unions, professional bodies, lobbyists, government agencies academics could decide to research on the wider implications of economic cycles on their operations. This is because they will have the resources needed to undertake this elaborate project as it reveals many aspects relevant to their successes in the increasingly competitive and challenging business environment.

With regard to a continuation of this study, deriving a method to quantify the effect of IT on business organization and their successes in the business environment would be important. The improved ability of technology to provide real-time data would enable

business organizations to get a real-time evaluation of their business with this kind of a parameter and this is highly important in unpredictable markets since today it is a milli-second difference between success and failure with high speed markets (MacKenzie, 2011).

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## APPENDIX

Survey		Survey #
Q1	What is your organizational position?	I work in the IT function or in IT management
Q2		I work in business management
Q3		I work as an expert or a consultant (or similar)
Q4		Open answers
Q5		What is the size of your organization measured with number of employees
Q6		What is the industry of your organization
A1	Evaluate how well do the statement below describe your organization	The role of IT as a future competitive advantage increases
A2		IT serves our business as a partner in the pursuing of strategic objectives
A3		We know well the impact of IT on our business
A4		In my organizations IT infrastructure, applications, data and processes establish a well integrated whole
A5		In my organization, business strategy, business models, operative model and IT architecture establish a well integrated whole
A6		In my organization, we develop systematically IT and IT management competencies needed to execute our business
A7		IT is hard to find IT professionals from Finland to the needs of my organization
B1	Evaluate how the current economic situation will impact the behavior of your organization	The objective of my organization is to increase the efficiency of IT by cutting IT costs
B2		The objective of my organization is to postpone IT purchases and IT investments
B3		The objective of my organization is to use IT to create new business
B4		The objective of my organization is to increase IT benefits by educating users
B5		The objective of my organization is to improve the quality of IT-enabled data/information and eliminate problems caused by fragmented data flows
B6		The objective of my organization is to integrate and consolidate our enterprise architecture
B7		The objective of my organization is to improve business driven IT management within our organization
B8		When my organization decided to make IT investments we require extremely short pay-back time

B9		When my organization decides to make IT investments we avoid long development project with uncertainties
C1	Evaluate also how the economic situation impacted the behavior of your organization during the last year	We increased the efficiency of IT by cutting IT costs
C2		We postponed IT purchases and IT investments
C3		We used IT to create new business
C4		We increased IT benefits by educating users
C5		We improved the quality of IT-enabled data/information and eliminated problems caused by fragmented data flows
C6		We integrated and consolidated our enterprise architecture
C7		We improved business driven IT management within our organization
C8		We required extremely short pay-back times from IT investments we made
C9		We avoided long development project with uncertainties when my organization made IT investments
D1	Evaluate IT's capability to facilitate innovations and to add value to business	IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes
D2		It is extremely important to our future success that IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes in the future
D3		On the basis of reliable metrics we know well what value IT provides to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes
E1	Evaluate IT's strategic management	We manage IT and develop its management as a strategic asset
E2		It is extremely important to our future success that we manage IT and develop its management as a strategic asset in the future
E3		We align the objectives of our IT activities with our business objectives so that we are able to evaluate how IT impacts the achievement of our business objectives
E4		Senior executives, business unit executives and IT executives share the accountabilities and responsibilities of IT management on the basis of clearly defined governance arrangement
E5		Based on reliable metrics we know well the benefits of IT management and its development as a strategic asset



F1	Evaluate IT purchases	In my organization the selection process of IT solutions works smoothly so that business needs are taken care of in IT purchases
F2		It is extremely important to the future success of my organization that In my organization the selection process of IT solutions works smoothly so that business needs are taken care of in IT purchases in the future
F3		We define measurable objectives for IT purchases so that business needs are well taken care of
F4		After IT purchases we follow the achievement of the objectives defined for IT purchases
F5		The competence of my organization to make IT purchases corresponds with the business needs of my organization
F6		My organization has funds available to to renew old IT solutions
F7		My organization has funds available to purchase new It solutions
G1		What elementary school grading (4-10) would you give to the deployment of IT as a whole within your organization
H1	Evaluate how IT projects succeed in your organization and what characteristics they have	The outcomes of IT projects correspond in general with plans
H2		IT projects keep their time-tables
H3		IT projects keep their agreed budgets
H4		IT projects achieve the business objectives defined for them
H5		IT projects are actually business development projects
H6		The competence of my organization to manage IT projects correspond with the business need of my organization
H7		We divide large and/or long projects into smaller parts
H8		Prior to the start of IT projects we think carefully what are their impacts on our activities and on key stakeholders
I1	Evaluate in percent's the impact of IT on on the financial performance of your organization	How many percents did innovations and new businesses facilitated by IT increase the revenues of your organization last year (%)
I2		How many percents did increases in the efficiency facilitated by IT reduce the total costs of your organization last year (%)
I3		How many percents did IT as a whole increase the profitability of your organization last year (%)
J1	Evaluate IT outsourcing	How big proportion approximately in percents of your organization's IT activities are outsourced

J2		My organization has a clear IT services purchasing strategy and action plan for IT resources and services purchasing
J3		My organization has a clear strategy and action plan for IT outsourcing
J4		The objective of my organization is to outsource as big part of IT activities as possible
J5		We have defined clear business and/or other objectives for IT outsourcing
J6		We know well the results of IT outsourcing in comparison the objectives defined for IT outsourcing based on reliable measures
J7		Name two IT outsourcing service providers that are the most relevant to your organization: Number 1
J8		Name two IT outsourcing service providers that are the most relevant to your organization: Number 2
K_string		Describe briefly at the most three IT competence areas the deployment of which are important to the future success of your organization
L1	How important do you consider the following factors describing the business impact and deployment IT for the success of your organization in the future	Cost savings form the deployment of IT
L2		Increase in the volume of current business facilitated by IT
L3		New IT facilitated activities, which increase revenues
L4		Increased customer satisfaction provided by IT
L5		Competitive advantages provided by IT
L6		Innovative new activities facilitated by IT
L7		Good mitigation of business impacting IT-risks
L8		Deployment of IT to steer and develop business processes
L9		Ability to find competent IT-professionals from Finland
M1	Evaluate how well the following statements on electronic business, social media and innovation systems describe your organization	My organization has a clear strategy and implementation plan for e-commerce as a part of business operations
M2		The goal of my organization is to increase significantly the use of e-business as a part of business operations
M3		My organization has a clear strategy and implementation plan for social media as a part of business operations

M4		The goal of my organization is to increase significantly the use of social media as a part of business operations
M5		We deploy Idea management applications to generate new ideas and innovations systematically
M6		We deploy innovation management systems to execute the development of innovations and ideas that have been selected to be executed
N1	My organization deploys social media	In communication
N2		In marketing
N3		in sales
N4		In research and development
N5		In customer service
N6		In logistics and supply chain management
N7		In purchasing
N8		In the manufacturing / production of goods and/or services
N9		In human resource management
N10		In accounting and financial reporting
O1	Evaluate how well the following IT-risk management related statements describe your organization	My organization has a clear strategy and implementation plan on how to secure the continuity of IT and business operations
O2		My organization has a clear strategy and implementation plan on how to manage data security
O3		We have defined limits or other clear objective for key IT-risks
O4		Our employees know the content of IT-risk management and performs according to the IT-risk management policies
O5		The management of IT and business continuity risks corresponds with the business needs of my organization
R1	Evaluate how well the following data management related statements describe your organization	We know well business transactions, master data, documents, reports and other data used in our business
R2		Business reporting including managerial reporting covers our activities well and is reliable
R3		We manage our current businesses and develop new businesses based on reliable good-quality data, that is, manage them with data
R4		We have agreed clearly the ownership and accountabilities of our data and information assets
R5		We secure that the quality of the data that we use in business is always maintained as high quality data
R6		We govern and manage data as a whole and develop these activities on the basis of a holistic roadmap

R7		My organization has a clear strategy and implementation plan on how to deploy big data in business
R8		The goal of my organization is to increase significantly the use of big data as a part of business operations
R9		My organization has a clear strategy and implementation plan on how to deploy industrial Internet / Internet of things in business
R10		The goal of my organization is to increase significantly the use of industrial Internet / Internet of things as a part of business operations
S1	Evaluate how well the following cloud services related statements describe your organization	My organization has a clear strategy and implementation plan on how to deploy cloud services in business
S2		The goal of my organization is to increase significantly the use of cloud services as a part of business operations
S3		If we would want to do so we could easily transfer our current It services to cloud services
S4		Unless cloud services function as we expect them to function we are able to return easily to the use of our past IT services
S5		The deployment of cloud services will make cost savings possible
S6		The deployment of cloud services will increase the efficiency of IT services
S7		The deployment of cloud services will increase the flexibility of IT services
S8		The deployment of cloud services will increase the ability to manage and govern IT services
S9		Cloud services are reliable in terms of functional reliability and continuity of services
S10		Cloud services are information secure
T1		Name two cloud services service providers that are the most relevant to your organization: Number 1
T2		Name two cloud services service providers that are the most relevant to your organization: Number 2
	duplicate do not use	Arvioi, miten hyvin alla olevat pilvipalveluita koskevat väittämät sopivat organisaatioonne.:Organisaatiollamme on selkeä strategia ja toimintasuunnitelma pilvipalvelujen hyödyntämiseksi
		Arvioi, miten hyvin alla olevat pilvipalveluita koskevat väittämät sopivat organisaatioonne.:Tavoitteenamme on lisätä pilvipalveluiden käyttöä mahdollisimman paljon

		Arvioi, miten hyvin alla olevat pilvipalveluita koskevat väittämät sopivat organisaatioonne.:Kykemme niin halutessamme siirtämään helposti nykyiset IT-palvelumme pilvipalveluiksi
		Arvioi, miten hyvin alla olevat pilvipalveluita koskevat väittämät sopivat organisaatioonne.:Eivät pilvipalvelut toimi odotustemme mukaisesti voimme palata helposti aikaisempaan palvelumalliin
		Arvioi, miten hyvin alla olevat pilvipalveluita koskevat väittämät sopivat organisaatioonne.:Pilvipalveluiden käyttö mahdollistaa merkittävät kustannussäästöt
		Arvioi, miten hyvin alla olevat pilvipalveluita koskevat väittämät sopivat organisaatioonne.:Pilvipalveluiden käyttö lisää IT-palveluiden tehokkuutta
		Arvioi, miten hyvin alla olevat pilvipalveluita koskevat väittämät sopivat organisaatioonne.:Pilvipalveluiden käyttö lisää IT-palveluiden joustavuutta
		Arvioi, miten hyvin alla olevat pilvipalveluita koskevat väittämät sopivat organisaatioonne.:Pilvipalveluiden käyttö lisää IT-palveluiden hallittavuutta
		Arvioi, miten hyvin alla olevat pilvipalveluita koskevat väittämät sopivat organisaatioonne.:Pilvipalvelut ovat toiminnaltaan ja jatkuvuudeltaan luotettavia
		Arvioi, miten hyvin alla olevat pilvipalveluita koskevat väittämät sopivat organisaatioonne.:Pilvipalvelut ovat tietoturvallisia
U1	Evaluate how well the following BYOD / IT consumerization related statements describe your organization	In my organization, BYOD / IT consumerization is acknowledged in IT strategy and implementation plan as well as in the development of IT services
U2		The goal of my organization is to enable the use of same devices at work and at leisure time
U3		The goal of my organization is to enable the use of same applications and services at work and at leisure time
U4		In my organization, BYOD / IT consumerization is acknowledged in IT strategy and implementation plan as well as in the development of IT services
U5		The current enterprise architecture of my organization enables the inclusion of BYOD devices, applications and services into enterprise architecture
U6		Pressures to allow the use of employees own devices and services at work are intense

	Evaluate the following statements which describe the benefits and limitations of BYOD / IT consumerization	
W1		Allowing BYOD increases work productivity
W2		Allowing BYOD produces costs savings
W3		Allowing BYOD increases motivation to work
W4		Allowing BYOD increases the attractive of our organization as a great place to work
W5		Allowing BYOD promotes the use of innovative work practices
W6		Allowing BYOD increases the need of It support
W7		Allowing BYOD increases information security risks
W8		Allowing BYOD increases the fragmentation of architecture
W9		Allowing BYOD makes it more difficult to control It costs
	Does your organization allow and support the use of the following BYOD devices and services	
X11		Own computer allowed
X12		Own computer not allowed
X13		Own computer supported
X14		Own computer not supported
X21		Own tablet/ pad allowed
X22		Own tablet/ pad not allowed
X23		Own tablet/ pad supported
X24		Own tablet/ pad not supported
X31		Own smart phone allowed
X32		Own smart phone not allowed
X33		Own smart phone supported
X34		Own smart phone not supported
X41		Use of Google docs, Google+, Office+ and similar services allowed
X42		Use of Google docs, Google+, Office+ and similar services not allowed
X43		Use of Google docs, Google+, Office+ and similar services supported
X44		Use of Google docs, Google+, Office+ and similar services not supported
X51		use of message services (messenger, Google, Yammer, Twitter etc.) allowed
X52		use of message services (messenger, Google, Yammer, Twitter etc.) not allowed
X53		use of message services (messenger, Google, Yammer, Twitter etc.) supported
X54		use of message services (messenger, Google, Yammer, Twitter etc.) not supported
X61		Use of Skype, WebEx, Lync and other similar services allowed

X62		Use of Skype, Webex, Lync and other similar services not allowed
X63		Use of Skype, Webex, Lync and other similar services supported
X64		Use of Skype, Webex, Lync and other similar services not supported
X71		Use of Dropbox and similar services allowed
X72		Use of Dropbox and similar services not allowed
X73		Use of Dropbox and similar services supported
X74		Use of Dropbox and similar services not supported
X81		Symbian devices allowed
X82		Symbian devices not allowed
X83		Symbian devices supported
X84		Symbian devices not supported
X91		Ios (iphone, Ipad, Imac) devices allowed
X92		Ios (iphone, Ipad, Imac) devices not allowed
X93		Ios (iphone, Ipad, Imac)n devices supported
X94		Ios (iphone, Ipad, Imac) devices not supported
X101		Android devices allowed
X102		Android devices not allowed
X103		Android devices supported
X104		Android devices not supported
X111		Mobile windows devices allowed
X112		Mobile windows devices not allowed
X113		Mobile windows devices supported
X114		Mobile windows devices not supported
AA1	Does your organization use the following best practice / IT governance methods	COBIT
AA2		ITIL
AA3		PRINCE2 / PMBOK
AA4		ISO/IEC 17799 / 27000 / similar
AA5		Zachman / TOGAF / something similar
AA6		ISO 9000 / Six Sigma / something similar
AA7		BPM / other process development methods
AB		Is the CIO / IT director of your organization a member in the steering committee of your organization?
AC1	To whom does the CIO / IT director of your organization report to?	CEO (Chief Executive officer)
AC2		CFO (Chief Financial Officer)
AC3		COO (Chief Operations Officer)
AC4		Other CxO, in what role?
AC5		Other than CxO, whom (open answers)
AD1	Evaluate how big is the proportion of IT costs from the revenues or the total budget of your organization	Percent (%) of revenues now

AD2		Percent (%) of total budget now
AD3		Percent (%) of revenues three years from now
AD4		Percent (%) of total budget three years from now
AE		Do the IT costs you evaluated include the costs of electronic business, IT enabled industrial etc. automation and IT components embedded into the products and services of your organization
AF		Do the costs of electronic business, IT enabled industrial and other automation and IT components embedded into the products and services increase more rapidly than traditional IT costs
AG1	Evaluate yourself as the respondent to the survey	I evaluate IT and its impacts on business most likely more positively than other persons who work in business or IT managerial positions within my organization
AG2		The deployment of IT is one of the factors that will impact most on the future success of organizations
AG3		In my organization business professionals are well capable to deploy IT to their work and accountabilities
AG4		In my organization IT professional approach It from the perspective that the purpose of IT is to execute the business of my organization