Walden University

COLLEGE OF MANAGEMENT AND TECHNOLOGY

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Walden University
2012

Abstract

Investigation into How Managers Justify Investments in IT Infrastructure

by

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MBA, University of Phoenix, 2006

BS, Federal Polytechnic Nekede Owerri Imo State-Nigeria, 1997

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Management

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Abstract

Organization leaders are dependent on information technology for corporate productivity; however, senior managers have expressed concerns about insufficient benefits from information technology investments. The problem researched was to understand how midsized businesses justify investments in information technology infrastructure. The purpose of this study was to investigate the business factors or approaches leaders of midsize businesses use to justify these investments. A qualitative case study approach was used for this exploration, with a combination of individual interviews and a small focus group. Research questions asked about types of investments as well as justifications of these investments. The conceptual support for the study was organization performance theory. Data were collected using a self-designed questionnaire and from a small focus group session, which were coded and analyzed for themes and patterns related to investments and justification. Findings were that managers justify investments in information technology infrastructure based on intangible benefits, including efficiency, customer services, high productivity, and gaining competitive advantage. This research can be adopted for complex initiatives within levels of organizations such as economic development planning, leadership programs, government projects, environmental development, and infrastructure investment projects. Implications of positive social change include increased productivity and revenue, improved efficiency, employee satisfaction, and cost savings to the organizations.

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Dedication

This work is dedicated to my lovely wife Iheyinwa Ibe for her endurance and support throughout this journey. I dedicate this work to our beloved children Richmondson Chinyeremeze and Akunna Kimberly Ibekanjo for taking time away from them to complete this dissertation. I also dedicate this work to my late father, Mr. Anthony Kanjo Ibe, who inspired me for this educational attainment, but who is not alive to witness this great achievement. Finally, I dedicate this work to my sweet mother, Mrs. Clara Ulumma Ibe, for her encouragement and discipline, which have helped me to achieve this goal. To all of you, I say thank you.

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Chapter 1: Introduction to the Study

The focus of this study was to investigate how managers justify investments in information technology (IT) infrastructure. According to Accenture (2009), 72% of business executives in IT organizations in the United States expect to increase their investments in IT infrastructure, yet it was not clear what justification approach they used. Symons (2008) examined justifications for IT infrastructure investment and funding, noting that investments in IT infrastructure infrequently connected directly to a business strategy objective, which makes it difficult to determine business value. In this study, I explored the justifications for investments in IT infrastructure. This chapter covers the background of the study, statement of the problem, purpose of the study, nature of the study, theoretical or conceptual support for the study, definition of terms, scope and delimitations, limitations, research questions, and significance of the study.

Background of the Study

Several researchers have been written about the justification of investment in IT infrastructure, but researchers have not yet addressed the issue of organizations leveraging resources through IT and at the same time making a profit from their investments in IT infrastructure. Dekleva (2005) researched this problem using a quantitative approach (valuation technique) to determine if there could be any justification for investments in IT infrastructure. In this study, I used a qualitative case study approach, which involved in-depth data collection with multiple sources of information within IT organizations. Organizations are dependent on IT, but executives are concerned about the justification of investments in IT infrastructure. According to

Accenture's (2009) global survey on investment in IT infrastructure among business and IT executives, 72% stated that their organizational leaders placed greater value on the current IT function than they did prior to the current economic crisis. Executives view IT as an important part of their economic recovery efforts, based on the findings of a global study released by Accenture (2009) and produced in cooperation with the Economist Intelligence Unit (EIU). From the report, executives' perceptions in their various organizations indicated that technology spending may increase, either selectively (47%) or collectively (10%) in the next 12 months. Further, non-IT executives appeared to expect a greater increase in IT spending than those directly involved in IT, as 61% anticipated technology spending boosts (Accenture, 2009). Surveys conducted in the United States showed that the executives indicated the need to invest in technology.

The majority (81%) of executives worldwide stated they experienced increasing demands to implement projects that include more flexibility than expected previously (Vujanic & Unkefer, 2009). In the United States, 87% of participants agreed. In a survey conducted in the United States, more than 550 executives indicated that cost savings and control are essential drivers in IT investment decisions. The participants stated there are three measures most effective in decreasing the cost of implementing IT projects: ensuring the firmness and importance of business needs of a project, the change or justification of the current systems, and shift to open platforms (Vujanic & Unkefer, 2009).

Alternatively, managers perceived that the future focus should be shifted from short-run product strategies to long-run strategies of intellectual capital such as human

capital, organizational capital, and relational capital in knowledge transfer (Chen, Shih, & Yang, 2009). Ambrose (2002), Zhang and Fung (2006), and other researchers discussed the relationships between intellectual capital factors. A few researchers discussed the justification of investments in IT infrastructure such as Dekleva (2005) and Symons (2008), noting the lack of significant data for evidence. The benefits realized by investing in IT infrastructure are hard to describe. As a result, tools used to measure future benefits for the organization becomes more difficult. Additionally, Symons (2008) asserted that several organizations were less concerned about using financial tools for analysis; rather, they funded infrastructural investment on faith without a business case.

This study considered different approaches to understand why few midsized businesses have a formal process in place to justify investments in IT infrastructure. Exploration of this case could lead to the discovery of alternative approaches to justify investments in IT infrastructure. Melville, Kraemer, and Gurbaxani (2004) used an integrative model of IT business value to determine if there were justifications for IT investments in infrastructure. This situation appeared to be a problem because the perception was that leaders of most IT companies have overlooked the importance of using alternative approach that incorporate IT intangibles for their investment justification.

Some financial models for IT investments exist, yet there is an absence of a proper method to evaluate the payoffs of IT investments. Even approaches such as the balanced scorecard and shareholder value analysis, which are used to provide frameworks for analysis and management, are insufficient (Accenture, 2009). Senior IT managers

were convinced that IT infrastructures create value and that if measured properly and with enough support, they would be significant profit making for their companies. However, they have little evidence to prove those results, establish the advantages, and find solutions that are vital to increase the benefits to their companies (Accenture, 2006).

Managers have used various traditional accounting techniques to calculate financial return on IT infrastructural investments (ROI), including present value (PV), net present value (NPV), and internal rate of return. According to Dekleva (2005), organizational leaders have started considering nonfinancial measures such as better and faster product design, improved customer service, increased employee effectiveness, and increased brand value and reputation. In addition, practitioners in finance and accounting considered that every investment should be based on verifiable ROI calculations. Further, Dekleva noted that not every calculation of ROI may be based on accounting perspectives only. Some intangible benefits exist that cannot be quantified easily. For example, Dekleva stated that questions exist about the worth of investing in a firewall to prove that such decisions cannot be based on traditional ROI figures. Yet cost estimates can be made to satisfy a need for numbers. According to Dekleva, managers in various organizations have attempted to answer the question whether alternative metrics should always be used apart from ROI to back decisions on IT investments. Dekleva also identified alternative approaches and made suggestions when those approaches may be more appropriate.

In justifying whether ROI should always be used for IT investment decision making, Dekleva (2005) discussed a study of 130 senior executives from companies that

averaged $230 million in annual IT spending. The faculty members at Kellogg School of Management at Northwestern University in conjunction with members at the Society for Information Management and the Diamond Cluster International Consulting firm conducted the study. The researchers noted that 51% of participants have no process to evaluate IT investments within their business strategy. Approximately 68% of the participants lacked the strategy of comparing their IT projects' benefits to original targets (Dekleva, 2005). Further, 74% of the participants had no financial measure to track their ROI after making investment decisions. Over 80% of participants said that quantifying IT benefits appears to be difficult because of the lack of financial skills. Alternatively, only 26% of executives agreed to use financial metrics to track their ROI after making an IT investment decision, and 63% of participants wanted to track their ROI after an IT investment decision. The researchers found that senior IT executives do not have knowledge of where to begin and lacked the financial training necessary to make such analyses (Dekleva, 2005). However, a few financial executives have a reasonable understanding of IT.

Between October 1999 and March 2000, in three out of the 30 companies studied, executives invested in at least one e-business initiative without a business case (Dekleva, 2005). According to Symons (2008) a survey conducted by Forrester reflected that 32% of the respondents do not use standard business case, and 63% do not conduct a post implementation benefits matrix on investments in IT infrastructure. Senior managers' initiatives perceived as strategic were mainly to allocate funds for financing the e-

business project, and executives from 16 companies invested widely in their companies' infrastructure.

Accenture's (2009) studies indicated that nonquantifiable benefits always have been a concern in constructing investment proposals; executives hesitantly suggested that nonquantifiable benefits have to be translated into monetary value. The executives resolved the *translation problem* by expecting that the relevant business functions can secure the benefits from the planned use of the new IT services. These business functions will ultimately need to be used to finance the projects to provide the IT services from which organizations expect to benefit. Examples of intangible benefits included customer services, increased safety, increased efficiency, decreases operational error, and a focus on public health matters. The benefits are considered good but difficult to quantify. To continue using ROI calculations as a standard to determine how organizations profit in their businesses, Dekleva (2005) suggested in some cases that models or assumptions help translate the nonfinancial benefits into financial metrics to allow use of traditional ROI calculations. Models used to quantify IT investment can be very complex, and analysis can be dependent on the validity of the assumptions. Further, gains from IT investments are often not obvious, and some people may interpret them as investments without profit. Previous researchers of IT investment stated from the outset that not everything was measurable by ROI, including customer satisfaction or the simplification of administrative work. As recognized by managers, a company's application development leaders may not confidently believe in obtaining quantifiable financial gains from IT investments, but a few managers succeed. Using the research reviewed, I

recognized that ROI numbers cannot be used to ensure that technology initiatives will be in line with business strategy. However, some leaders in various organizations suggested that ROI figures should be used as a means to ensure that the planning was as comprehensive as possible and ensure the totality of the effect has been considered.

Statement of the Problem

The problem researched was to understand how midsized businesses justify investments in IT infrastructure. With the dynamic nature of business, justifying investments in IT infrastructure appears to be difficult. The major problem in justifying investments in IT infrastructure was that little research has been conducted in this area and little was known. According to Wessels (2003), leaders of organizations adopted the same formal process in justifying investments in IT infrastructure, and the tools used by accountant or managers to calculate costs and benefits are not well understood. In addition, organizations do not always perform evaluations or cost-benefit analyses and sometimes report mixed or confused result. The intangible benefits of investments in IT infrastructure make the justification complex and difficult to achieve. Tangible benefits are those benefits that can be quantified and assigned monetary value, while intangible benefits cannot be quantified and assigned monetary value such as customer services (Wessels, 2003).

Several studies conducted on investments in IT infrastructure sought to understand if there could be any acceptable model for justification of IT investment. Remenyi et al. (as cited in Wessels, 2003) researched several models and approaches in an attempt to discover an acceptable model that takes many factors into consideration.

However, no single method has been universally accepted, and it is the responsibility of the decision maker to choose an approach. Further, the formal method and combination of methods are constrained by the limit of numerical representation and modeling of human reasoning. The process of IT investment, according to Bannister and Renenyeni (as cited in Wessels, 2003), in other areas of the organization are made based on the same formal process in place.

Currently, most new processes, activities, and products introduced by executives require investments in IT infrastructure for full implementation. Business leaders often have to make large investments in IT infrastructure. In addition, spending decisions in IT infrastructure and new applications have become more complex. In measuring the benefits of investments in IT, leaders of many companies have spent significant time and money implementing sophisticated IT systems with the same formal process of IT investment justification. In many organizations, decision makers overlooked economic judgments in justifying expenditures and instead acquired the best and most recent technologies to overtake others, regardless of the results achieved. More than two-thirds of chief information officers (CIOs) reported in a recent survey that they had no process in place for justifying the investment of their IT projects (Appel et al., 2005).

Purpose of the Study

The purpose of this qualitative case study was to investigate the business factors or approaches leaders of midsize businesses use to justify investments in IT infrastructure. Previous research on this topic has shown that a general approach such as ROI adopted by leaders of organizations as a standard model used to justify investments

in IT infrastructure does not translate the nonfinancial benefits into financial metrics (Dekleva, 2005). Therefore, this study sought to explain the processes leaders of the organization adopt to justify investments in IT infrastructure.

The qualitative case study helped to explore the approach used to justify investments in IT infrastructures such as data backup/recovery, firewalls, business processes, and organizational learning that represent important assets to the organization. However, they may not be readily quantified in monetary value and as such appeared not to be justifiable. This point can be seen from previous researchers such as Dekleva (2005) who suggested in some cases that models or assumptions help translate the nonfinancial benefits into financial metrics to allow traditional ROI calculations to continue to be used. The complexity in quantifying these infrastructural intangibles set the boundaries on how to justify the IT investment for infrastructure. The importance of the research was to create an awareness on spending decisions made by IT organizations and to explore how managers justify investments in IT infrastructure. The population was managers from three IT companies.

Nature of the Study

One reason for selecting a qualitative case study was that a qualitative study gives a better understanding than other methods and designs of participants' experiences. Additionally, a qualitative case study describes fully the phenomenon, which was an important consideration not only from my viewpoint as the researcher but also from the readers' perspectives. I selected a qualitative case study because this approach allowed the exploration of the behavior of managers regarding IT investment. The case study

approach helped to identify cases with boundaries and provide an in-depth understanding of the cases (Creswell, 2007). I conducted a pilot study to validate the interview questions before the data collection for the research study began. I include a more detailed discussion of the selection of a qualitative case study in chapter 3.

Research Questions

I used two central research questions, functionally decomposed into a set of 10 interview questions, in this study. Interview Questions 1 to 6 were derived from Research Question (RQ1), and Interview Questions 7 to 10 were derived from Research Question 2 (RQ2). See Appendix A for a list of the interview questions.

RQ1: How do organizational leaders justify investments in IT infrastructure?

RQ2: How do investments in IT infrastructure produce the desired results in organizations?

Conceptual Framework

The conceptual support for the study was organization performance theory. Murphy et al. (1996) indicated that within organization theory, three fundamental theoretical approaches have been developed to measure organizational effectiveness. Murphy et al. indicated that a goal-based approach can be used to evaluate an organization by the goals that leaders set for the organization. However, organizational leaders have varied and sometimes contradictory goals, making cross firm comparisons difficult. Murphy et al. (1996) believed that organizations are of different forms, and based on the form, the organizational leaders could behave in certain ways, causing

researchers often to focus their study sample in a particular industry to control the differences regarding firm effectiveness and profitability.

The *multiple constituency approach* factors in these differences in perspectives and examines the extent to which the agenda of various stakeholders groups are satisfied (Connolly, Conlon, & Deutsch, 1980; Pennings & Goodman, 1977; Pfeffer & Salancik, 1978; Thompson, 1967). Venkatraman and Ramanujam (1986) discussed organizational performance measurement in terms of three hierarchical constructs (i.e., organizational effectiveness, operational performance, and financial performance) and argued that three organizational theoretical perspectives reflect the writings on organizational effectiveness constructs. For this study, the focus was on how managers justify IT investment for infrastructure within the organization.

A second theory that I used to support the study was the *complementary asset* theory in which proponents stressed that IT is an important component of corporate competitive advantage but that corporate competitive advantage cannot only rely on IT. Further, if depending on IT only, organizations cannot maintain competitive advantage for long (Carr, 2003). In addition, corporate information systems should develop a niche to gain competitive advantage. According to Carr (2003), organizational leaders need to consider the concept of balance and consider the risks of using IT from a practical viewpoint rather than only considering the benefits provided. One risk involves overspending. The implementation of IT upgrades is required in nearly every application, regardless of the complexity, and often company leaders are careless in using IT resources. Carr noted that to gain strategic advantage, the most beneficial way to invest in

IT assets and manage the system was to control cost and risks by spending less, delaying IT investments when possible, and shifting the IT focus from seeking opportunities to managing vulnerabilities. These complementary assets "include accumulated financial asset, brand asset, channel asset, partner relationship, large number of customers, and specialized knowledge" (p. 5). Carr referred to complementary assets as intellectual capital. According to Carr, IT investments need various sources of capital, "including human capital, organizational capital, process capital, innovation capital, customer capital, and financial capital" (p. 5). Accenture, (2009) noted that research experts have suggested that organizational business effectiveness had a direct influence on intellectual capital. Researchers also suggested that leaders who depended on intellectual capital to create better business effectiveness were not successful. However, some factors may depend on other factors for business growth or improvement on infrastructure, and value can arise from the interaction of other factors (Accenture, 2009).

Edvinsson and Malone (1997) stressed the usefulness of communication between intellectual capital influences and stressed that communication between factors can create value. Youndt and Subramanian (2004) proposed a similar view and indicated that the larger picture was neglected if intellectual capital was considered as an independent dimension; the effect of intellectual capital measurement on the firm may not be observed completely. To understand how intellectual capital was used to drive organizational effectiveness of infrastructure, the focus should be placed on intellectual capital rather than individual dimensions. Likewise, only putting emphasis on IT was not enough when justifying the IT investment for infrastructure. Additionally, other factors related to IT

should be taken into account to understand how managers justify the IT investment for infrastructure (Carr, 2003).

According to Stewart (2011), the economic value-added (EVA) framework is an approach developed to justify IT investment or used to calculate an investor's value in a company. EVA evaluates the significant change between the return on a firm's cost of capital and capital. EVA appears to be a suitable method to discover the value of operations in relation to other methods like accounting profit. Additionally, Stewart stated that the management appeared to view more value in IT investment if EVA was use as a performance appraisal of cost evaluation and the IT function does not require repeated justification on its existence and investment. For example, Stewart (2011) perceived that as an organization expands and has IT operations in different areas, each operational area would have different structures such as taxation and regulatory needs. Therefore, these differences made it impossible to adopt a particular method or use methods like return on equity (ROE) or return on capital employed (ROCE) as a method to evaluate IT operations in different operating centers. This condition could lead the manager in making wrong decisions for IT investment. Alternatively, managers should examine their ability to produce operating income earnings before interest and taxes (EBIT) with functional assets under a manager's control (Stewart, 2011). Further, Stewart (2011) asserted that the best evaluation of a firm's profitability was not just the measure of ROI, but the firm's learning experiences that produce investors' value over the measurement period. EVA and not ROI can be applied to determine whether a firm or its business units are adding value to the investor's wealth. The EVA method can be applied

to the entire organization regardless of the location or area of jurisdiction and is a very reliable framework (Stewart, 2011).

Investments in IT infrastructure appear to enhance organizational effectiveness, but how managers justify the investment was the focus of this research study. Regardless of the positive experiences and case reports, some important questions had not yet been answered. Even the most critical question has not been completely and indisputably answered. The justification of IT infrastructure investment has become an issue; Mingay, Furlonger, and Magee (1998) stated that clients are not happy with the information systems organization because of their lack of solutions, and high cost of deploying IT infrastructure.

The framework for this study also used the balanced scorecard model, which has four interactive modules. These modules include: Finance, Customer, Learning and Growth, and Business Processes (Kaplan & Norton, 1996). The framework was a possible view of a required infrastructure investment, from the perspective of customer need or demand. Replacing customer need with government compliance or top management mandate would provide related views of the model. A financial measure was used to quantify IT investment for infrastructure as not everything can be measured in dollars by using the traditional method of ROI. The customer's need and business process are intangibles that cannot be measured using the accounting method of ROI. For example, data backup/recovery, firewalls, business processes, and organizational learning are important assets to the organization. However, they cannot be quantified in monetary values, and as such may appear not to be justifiable. In addition, some estimates are

possible to provide a dollar number for those executives who require one. For example, Epstein (2008) noted one concept that could be of value in estimating value: management's willingness to pay. Estimates of what managers are willing to pay are possible to obtain through conversation, interviews, focus groups, and so on. The main focus of this framework was to show the connection of these IT investments for infrastructure and to see if there could be any method of calculation to justify investment for infrastructure.

Definition of Terms

Business case: A detailed presentation of investment benefits, including ROI figures (Dekleva, 2005).

*Capital***:** Money used to generate income or make investments ("Financial Dictionary," 2008).

*Computing as a service (CaaS)***:** An outsourced communications solution supplied by a single vendor to a business enterprise ("Computing as a Service," 2008).

Earnings before investments and taxes (EBIT): Earnings before taxes are defined as a measure of a company's ability to produce income on its operations in a giving year ("Financial Dictionary," 2009).

Elasticity: The economies of scale of cloud computing. Additionally, elasticity is the movement of applications massively and then back down to zero within cloud environment (Staten, 2011).

Economic value added: The measure of the financial performance of an organization (Mahapatra, 2011).

Evaluation. Evaluation was defined as the criteria, and evidence used in making judgments for decision making process ("Washington State Board for Community and Technical Colleges," 2006).

HPC infrastructure: High performance computing systems are systems designed to adapt with the technology changes (Staten, 2011).

IT infrastructure: A set of organizational service-based systems budgeted by management and comprise both human and technical capabilities. These include Computer hardware, applications, telecommunications, database, IT education services, and IT research, and development (Sarker, 2008).

IT intangibles benefits: Information technology benefits that cannot be quantified or assigned monetary value (Wessels, 2003).

*Reinforcement***:** The addition of strengthening or supporting material to make organization stronger or more powerful ("Reinforcement," 2011).

Return on equity (ROE): Net income for the past 12 months divided by shareholder Equity (Harvey, 2004).

Return on capital employed (ROCE): Operating profit before taxes divided by the total Assets minus the current liabilities ("Farlex Financial dictionary," 2009).

Return on investment (ROI): Return on investment, and calculated as the return of benefit of an investment divided by the investment cost, which can be expressed as a percentage ratio ("ROI," 2011) also has been defined as earnings after taxes / total assets

Tangible benefits: Benefits that are quantifiable and can be assigned monetary value (Wessels, 2003).

Transiency: The time taken for client to stay in the cloud, which determines the cost model for the cloud infrastructure (Staten, 2011).

Assumptions

I made the following three assumptions: First, the lack of justifiable metrics could affect managers' decisions to fund investments in IT infrastructure. Second, the research sample would supply enough representation of managers within the organizations selected for the study. Third, the participants were willing, open, and honest in their responses.

Scope and Delimitations

The scope of the study was one city, and within that city, a few IT staff and managers of three midsize IT companies. The study focused on investments in IT infrastructure. More precisely, the question of how managers justify investments in IT infrastructure was explored in this study.

Limitations

The study was limited to a city in the United States, three midsized companies, a few managers and staff, and a limited sample. The findings in this study could not be generalized because the three midsized companies were purposefully selected. The success or failure on how managers justify investments in IT infrastructure depended on information gathered from the participants through the questionnaires.

Significance of the Study

The significance of the study to IT business is that it could lead to positive social changes, which include helping the organization to prioritize and determine the

investment structure within their organizations. The application of this research could also help the organization to increase revenue, which will improve organizational performance. In addition, businesses interested in a new method of planning, evaluation, and monitoring can also benefit from this study. Further, this research can provide guidance for complicated initiatives within levels of organizations, economic development planning, leadership programs, environmental development, and infrastructure investment projects.

The study was important because of the perception that IT investment has become an issue that affects decision makers and their organizations. This situation is because at least some managers in different organizations fund their investments on faith (Symons, 2008). Additionally, most decisions on IT investments are based on a formal process that fails to account for intangibles. The research study was a review of the approaches or processes managers adopted to justify investments in IT infrastructure. The significance of this study to academia is that a new approach to justifying investments in IT infrastructure may be developed that may be useful to organizations elsewhere. This approach could be adopted into academic curriculum as well as in university sponsored seminars.

Summary and Transition

In this chapter, I provided a general introduction to the problem areas on the investigation of how managers justify investments in IT infrastructure. I also discussed the importance of IT to corporate productivity and the concerns executives had regarding insufficient benefits from IT investments. I discussed discrepancies in models and

approaches used to justify investments in IT infrastructure in an attempt to discover models that could account for intangibles that cannot be quantified or assigned monetary value. IT managers in the United States anticipated an increase in IT spending over the next 3 years. This chapter outlined an approach to the study of how managers justify investments in IT infrastructure. Chapter 2 covers the literature review, chapter 3 covers the research method, chapter 4 presents the results or findings, and chapter 5 covers a final summary, conclusions, and recommendations.

Chapter 2: Literature Review

The purpose of this chapter is to review literature relevant to how managers justify investments in IT infrastructure. The organization of this literature review is the funnel approach. The review of the literature starts with a broader view of the proposed study scope, less related to the specific problems, and moves to literature directly related to the problem areas. In addition, I summarize the literature and research that addresses the research problem. The focus of the literature review is the investigation of how managers justify investments in IT infrastructure.

Literature Review Search

The primary sources for the literature review include peer-reviewed journal articles, dissertations, professional websites, and federal government publications. Journals used for the review were accessed using the following Walden University databases: ProQuest Central, Science Direct, InfoSci, EBSCOhost, and ERIC. Some of the key words used in the literature review search included: *IT investment*, *organizational performance measures*, *IT investment for infrastructure*, and *IT investment decision-making processes*. The literature review is an examination of investing in IT infrastructure. Improvements in IT often are meaningful and introduce unforeseen changes to business processes that could be positive. The goal was to discover ways to decide what technology was important to help organizational leaders make decisions on IT investment for infrastructure (Gourley, 2009).

Internationalization of IT

According to Gourley (2009), the technology list composed of the 16 largest IT firms included Microsoft, Apple, IBM, Google, Cisco, Intel, Hewlett-Packard, Oracle, QUALCOMM, SAP, EMC, Dell, Yahoo, Adobe, VMware, and Symantec. These companies all have a market capitalization of over $16 billion. A review of the list showed that with the exception of one company, SAP, all companies on the list are American companies (Gourley, 2009). Although these companies are based in the United States, all the companies on the list operated globally with research and development labs worldwide. Gourley (2009) indicated that even if a U.S. company was developing specific capabilities, it could not be concluded that the capability was developed in the United States.

Gourley (2009) emphasized that acceleration of IT infrastructural components are increasing with no indications of slowing because other technology segments (e.g., nanotech and biotech) are also accelerating and are contributing to IT in unexpected ways (Gourley, 2009). The list of these companies above with greater than $16 billion market capitalization was a reflection of the importance organizations attach to IT investment, but the focus of this review was justification of IT investment for infrastructure.

Challenges and Opportunities Faced by U.S. Firms in the Global Market

According to Pilaroscia (1998), basic infrastructure demands such as power and telecommunication systems are increasing all over the world as many developing countries aspire to build or improve their infrastructural systems and services. For example, Merlyn (2009) argued that U.S. infrastructure development in the 1950s was

about 7% of the GDP, invested in highways, buildings, and other infrastructure. However, Merlyn observed that the total expenditure declined to 4% in recent years. Pilaroscia (1998) perceived that as the world demand for infrastructure increases, a significant part of the growth would occur in emerging markets. The World Bank calculated a yearly infrastructure investment demand in the total amount of $200 billion. According to Pilaroscia, the power sector accounted for half of the total estimated budget for IT infrastructure investment. Additionally, Pilaroscia predicted that the private sector was likely to take over the infrastructural investment if national and regional governments could not commit to the projects.

Further, the involvement of the private sector in infrastructure development projects as well as acquisition of privatized public sector monopolies would bring many benefits. Moreover, competition in any case enhances the supply and quality of infrastructure services and increases the standard of living. Pilaroscia stated that the private sector's involvement in infrastructure investment created room for government to divert their investment allocations to other social needs. Verizon, for example, invested about $560 million in Maryland's telecommunication network in 2001. According to Verizon Fiber Optics Business (2002), "Verizon's capital investment in 2001 was used primarily to expand the company's fiber optic and other cable facilities, as well as to increase the capacity and reliability of several of the company's call-routing centers" (Para. 2).

Organizational Infrastructure Investment

Investment in IT infrastructure to increase organizational effectiveness has been the topic of ongoing research during the last 30 years (Kim, Xiang, & Lee, 2009). Kim, Xiang, and Lee (2009) indicated that irrefutable and meaningful advantages could be obtained from IT investments. Further, some meaningful factors such as (a) labor costs, (b) competition, (c) IT capabilities, (d) cultural values, and (e) education could affect the method or means of IT value creation. Kim et al. (2009) noted that no relationship exists between investments in IT infrastructure and organizational effectiveness, but rather that IT investments may have a negative influence on a company's productivity because of managers' inefficiency or inability to find solutions. The flexibility of management learning experiences—such as marketing, research, and process of change (R&D), advertising, and other capital for a firm's effectiveness—was impressively larger than the flexibility of IT capital. A worst case scenario would seem to be that as a company invested more in IT infrastructure, negative human implications such as reduction in labor force could occur.

Kim et al. (2009) also noted that a meaningful relationship exists between IT investments for infrastructure and benefits to a firm. They used several methods and sample data to clarify the benefit-investment relationship and found a positive correlation between IT investment for infrastructure and benefits realized from the investment. Further, Kim et al. observed a variety of inconsistent results; for some variables, a negative correlation or effect was shown. Kim et al. suggested that the only way to clarify confusing results was to adopt a more methodical set of research ideas, including (a)

important sample data sets, (b) presence of extra factors such as a time lag and the information-knowledge of the firm, (c) current methodology (e.g., structural equation modeling), and (d) current theories such as a resource-based view (RBV).

Existing studies had shown the beneficial effects, or at least mixed effects, of IT investment for infrastructure (Kim et al., 2009). The IT resource base view and organizational resources as applied to the literature could be classified into different categories such as: (a) IT infrastructure, (b) business application (c) technology skill, and (d) managerial skills (Kim et al., 2009). However, the focus among all these resources as outlined above in this literature review was IT infrastructure and how managers justify the investment.

Accenture (2009) noted that 72% of business and IT executives said that their organization placed greater value on the IT function in the current economic crisis than they did before the crisis. In addition, most executives viewed IT as an important part of their economic recovery efforts, according to the discoveries of a global study released by Accenture and produced in cooperation with the Economist Intelligence Unit (EIU; Accenture, 2009). Consequently, executives expect technology spending to increase in their organizations either selectively (47%) of the executives or across the board (10%) in the next 12 months.

IT Investment Risk Management

According to Bender and Nielsen (2009), for investment processes to be successful, managers must assess the risk factors that could affect investment decisions. Bender and Nielsen outlined a best practices framework that depends on three structures,

namely, measurement of risk, monitoring of risk, and investment risk-adjustment management. These three management risks appeared to be the most crucial for investment decisions. Bender and Nielsen stated that measurement of risk was a process of applying the right method to quantify risk from various angles. Monitoring of risk was a process of tracking the output from the method and identifying anomalies on a frequent and timely basis. The risk-adjusted investment management (RAIM) was used for risk information measurement and portfolio monitoring with respect to future risk tolerance.

Further, Bender and Nielson (2009) saw risk management to be in the leading position in the last 18 months as a result of economic crisis, reflecting the importance of leadership on best practices for investors. Presently, investment managers argue that risk management guidelines fail when they were needed most, and with many incidents continued across formerly unrelated asset classes, investors have doubted the very significance of terms such as "well diversified portfolio" (para. 2) and asked, "what does sound risk management mean for plans, foundations, endowments, and other organization investment?" (para. 2). Bender and Nielson (2009) developed three guiding principles, which included the following:

- Risk management should be practiced by everyone positioned to make investment decisions. In addition, risk managers are not the only ones that should practice risk management. Bender and Nielson (2009) viewed risk management as a tool that guides anyone making investment decisions.

- Managers may not make investment decisions if they cannot access and quantify risk. The investors require a framework for risk management to make informed decision that aligned with organization's strategic objectives.
- Bender and Nielsen asserted, "Proactive risk management was better than reactive risk management" (para. 2). The most important lesson learned from the recent economic crisis was to be prepared for unlikely events. This lesson applies to both market and nonmarket risks.

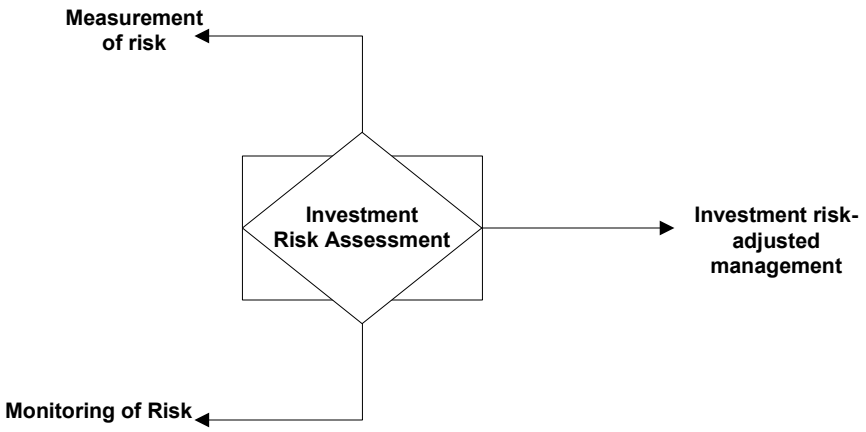

Figure 1. The investment risk assessment framework. Based on the framework created by Bender and Nielsen, 2009.

Figure 1 represents the investment risk assessment framework, and the illustration classifies risk into three main components. The risk breakdown framework guides the manager who is making investment decisions to measure and capture different views of risks. Measurement of risk refers to the method managers use to measure and quantify risk for decision-making processes. Monitoring of risk is the process of evaluating changes in the risk portfolio over a given period. The investment risk-adjusted

management determines how investment managers may react to their investment portfolios when there are expected changes in the risk path (Bender & Nielsen, 2009).

According to Thrasher (2009), in justifying IT investment for security infrastructure, "No matter how much money you spend on security infrastructure, the organization will never be totally safe and secure" (para 5). Rather, Thrasher emphasized that the justification of the IT infrastructure investment on security, database reliability or resilient servers depends on the amount of risk the organization is willing to tolerate. Moreover, risk can never be eliminated but can be mitigated. Thrasher suggested four guidelines for determining the IT security investment, which include the following:

- Benchmarking: In this case, managers should look into what other companies are doing in terms of risk tolerance, and compared to the system in their organization.
- Not only determining the type of risk and the security infrastructure to be implemented, but also patient information cannot be disclosed? For example, Credit card information, organizational payrolls, or investment information, are not to be disclosed as well.
- Is there anything that differentiates the organization from its competitors either by *superior* level of trust or risk avoidance? For example, is the organization want to be viewed by their clients as more trusted or as organization that lacked information security compared to other organizations?
- Does the organization hold ownership advantages over its competitors, or could be seen as the organization that lacked confidential organizational information.

The Framework of IT Investment for Infrastructure

Ross and Beath (2002) stated that for the past 15 years, managers have struggled to achieve long and short-term profitability in growth through their IT investments. Managers confidently believe that investment in IT would be profitable, especially from new business applications. Further, managers of different organizations perceived that investment in IT infrastructure was something important for their survival, especially in this era of electronic business opportunities. Infrastructure services such as systems integration, accessibility of data, and secured networks are critical to short-term gains. The development of business applications appears to be the main focus of different organizations that drive long-term growth and survival. Additionally, Ross and Beath asserted that during the analysis of organizational practices, they observed that investment differs in two dimensions: namely, strategic and IT capabilities.

For example, Ross and Breath (2002) stated that when senior managers of United Parcel Services (UPS) saw the need to invest in package tracking, they discovered that developing the capability was not as simple as writing or buying a package tracking application. Additionally, senior managers realized that they needed to develop their own network, database, and processing infrastructure before implementing the technology. During the same era, Delta Airlines began looking into an IT overhaul within the airport systems and infrastructure as strategic to their business objectives. The quest for restructuring was to address concerns related to the year 2000 (Y2K). According to Ross and Beath, each request offered a business case that promised meaningful positive returns on investment. In justifying investments in IT infrastructure, managers should always

emphasize a business case to make informed decisions. Further, Ross and Beath conducted 48 interviews at 12 e-commerce companies and asked how the companies justified investments in their e-business systems and infrastructure. In summary, the responses were: "Out of 30 companies, 25 said they traditionally relied on making a business case to justify IT-investment funding. All but three, however, funded at least one e-business initiative without a business case" (p. 52).

The Effect of Information Systems on Organization and Market

In this next section, I examine the effect of information systems on organizations and markets, in particular the health care systems and government. The theoretical frameworks used for this literature review were agency theory and transaction cost economics. The research covered an examination of how information systems affect key measures of productive efficiency. Gurbaxani and Whang (1991), asserted that information systems add significant value to organizational activities and performance to stay competitive. Agarwal (2009) recommended that company leaders continue to invest in technology to seek competitive advantages.

Agarwal (2009) indicated that a strong emphasis exists in the development and procurement of IT for clinical leadership in the health care industry. Information systems have become integral, online, interactive tools involved in the minute-to-minute operations and decision-making of large health care providers. Over the last decade, information systems had fundamentally altered the economics of organizations and increased the possibilities for organizing work. IT had several influences on the health care industry including economic, organizational, and behavioral influences. Market

information on the health care system infrastructure in the United States in 2006 consisted of hospital ($662.5 billion), clinical, and physician services ($463.3 billion), drug prescription ($219.2 billion), home health and nursing home ($181.5 billion), and other activities summing up to $549.2 billion (Agarwal, 2009). U.S. health care costs on infrastructure and other related cost are expected to rise from $2.17 trillion in 2006 to $2.88 trillion in 2010, with yearly increases averaging about 7%. The economic impact of IT has been significant. In hospital settings across America, IT has made hospitals more efficient. Administratively, clerical personnel were replaced with sophisticated IT equipment. Electronic billing, telemedicine, transfer of digital radiography, payroll, scheduling, data transfers, and other innovations contribute to decreasing the cost of services provided by hospitals.

Clinically, medication errors occur frequently and had significant clinical and financial consequences (Kaushalas & Bates, 2002). Information systems have preventive controls, which decrease such occurrences. Organizations have improved systems that give physicians the power to provide protocols on the decisions of alerts and reminders. In addition, physicians coordinate and manage patients' care (Kaushalas & Bates, 2002). Several types of IT decrease rates of medication errors. A computerized physician order entry system with decision support significantly reduces serious inpatient medication error rates in adults. Other available IT that may prove effective for patients include computerized medication administration records, robots, automated pharmacy systems, bar coding, *smart* intravenous devices, and computerized discharge prescriptions and instructions. Corporations have depended heavily on IT systems to help them quickly

identified severe financial hemorrhaging of recently acquired hospitals. These corporations focus on supply chain management cost drivers, income generating services, and key personnel.

Information systems provide efficiency and competitive strategy to the health care industry, but the aim of investment in any business is to maximize profit, which is the return on investment. Therefore, investigating how managers justify investment in IT infrastructure helps organization realize their long-term objectives. Kenny (2010) perceived that technology organizations are yet to see clearly into applications to make careful, fact-based decisions for correctly aligned portfolios. For example, organizations cannot identify what applications need to be kept, which ones are redundant, and which ones could be retired.

According to Kenny (2010), some company leaders may have an inventory of applications, but they generally do not have a complete view of the portfolio or a mechanism to conduct regular updates. By understanding the current *investments* in the project portfolio in phases one through three of investments in IT infrastructure, technology managers could determine how to regulate investments for the greatest business influence--today and in the future.

Further, Kenny (2010) clarified where to invest in the most critical business applications and how to scrutinize expensive or unwieldy applications for IT investment. Dynamic portfolio management in project phase four of IT investment as stated by Kenny's review provided continual view and creates room for adjustment to control the investment cost. Additionally, optimize costs, and drive change in the organization.

However, Kenny's perception on the portfolio management is to developing a clear vision on the investments in IT infrastructure needed to control the cost. This could be achieved only by knowing what was in the overall portfolio and the source of spending. Armed with this level of understanding, organizations could take control, make informed decisions and further drive innovation rather than focusing *on* maintenance (Kenny, 2010).

U.S. Information Technology Spending to Reach $568B in 2010

A market outlook on IT spending gives a clear vision of how managers justify investments in IT infrastructure. The implications for positive social change include cost savings to the IT organizations and realization of increased revenue, which could improve organizational performance. Without having knowledge of IT spending, it would be difficult to see how managers justify investment for infrastructure. According to Burt (2010), U.S. IT sales would grow 6.8% to $568 billion in 2010, driven by software and computer hardware sales. Burt also predicted that after a difficult period between 2008 and 2009, investments would improve in the U.S. IT market, and sales would climb 6.6% to $568 billion in 2010.

Globally, Burt (2010) expected IT sales to jump 8.1% to more than $1.6 trillion. The recovery would be led by software and computer hardware, driven by what was called *smart computing* (para. 6). Andrew, a vice president and principal analyst of Forrester Research, stated, "New technologies of awareness married to advanced business intelligence analytics make computing smart" (quoted in Burt, 2010, para. 6). Andrew further stated, "Smart Computing rests on new foundation technologies such as service-

oriented architecture, server, and storage virtualization, cloud computing, and unified communications" (p. 8). According to Burt, 2010 was a marker for the next phase of technology advancement (p. 8). Burt noted that all the pieces are in place for a 2010 technology spending recovery in the United States that would be stronger than the overall economic recovery, with anticipation that technology spending would increase to more than twice the rate of GDP in 2010 (para. 5). Burt predicted U.S. IT sales would shrink 3.1% in 2009. Additionally, Burt stated that Gartner predicted a global market decline of 3.8% for 2009. However, Minton and Shirer (2010) were much more pessimistic than Forrester, putting worldwide IT spending growth at 3.2%. Minton and Shirer noted that hardware, software, and services spending would each grow in the 2% range, with hardware experiencing the most notable gains after a particularly difficult year in 2009.

Minton and Shirer (2010) indicated that computer equipment purchases are expected to increase 8.2%, communications equipment purchases by 7.6%, software spending by 9.7%, IT consulting and integrated services of systems by 6.8%, and IT outsourcing services by 7.1%. According to Minton and Shirer, U.S. businesses may not see the biggest increase by percentage basis, but the increase would be in dollars spent. Minton and Shirer perceived that European businesses could see the biggest change, an increase of 11.2%, followed by Canada (9.9%), the Asia-Pacific (7.8%), and Latin America (7.7%). The 38-page report, *U.S. and Global IT Market Outlook 2009*, included a more detailed breakdown of IT spending by sector and region (Minton & Shirer, 2010). The report confirmed what was predicted by the Accenture global survey in 2009 about IT spending increases.

According to the report from (Computer Economics, 2011), the study discovered that average spending on IT operations was increasing by 5%, which was well above average by 2% in growth for organizations within United States and Canada. In addition, the study discovered also that the high-tech sector had better than median improvement in IT spending. In fact, there were average growth rates of 4.5%, 3.8%, and 3.5% in IT spending respectively. Further, the Computer Economics report hinted that government spending on IT has declined by 3% the second year in a row. The report also noted that some sectors are falling in between on IT spending such as the health care providers (3.1%), process manufacturing (2.5%), energy and utilities (1.8%), and technical services (1.7%).

The focus in most of the literature was that the effect of IT on organizational performance seemed to be positive, thus requiring organizational leaders to invest more in IT as a competitive strategy. However, not enough research has considered how to sustain infrastructure investments in IT. The literature only concentrated on IT spending but has not shown any metrics to realize the return on investment, which may be critical at this point of economic downtime. Technology recovery in the United States has been much stronger than the overall economic recovery, with spending on technology increasing at more than twice the rate of GDP (Accenture, 2009, para. 2). However, if the technology spending outpaces the GDP, it may have a negative influence on the domestic economy. Goods and services are exported oversees as opposed to being consumed domestically.

In a recent study by Forrester Research on IT investments, Bartels (2010) stated that part of the increased technology investment was a replacement of old servers and PCs instead of finding ways to cut costs and improve efficiency. The perception appears to be that conditions have not changed but purchases had been good news for the U.S. technology market. According to Bartels, it had not been good for the overall economy because organizational leaders had to justify their spending and make efficient use of their resources. The lift to U.S. economic growth from business IT investments was positive, but the reluctance by corporate leaders to hire new employees made consumers reluctant to spend (Bartels, 2010). Further, Bartels asserted that much of the business investment in computer equipment was the importation of products, which was also influencing U.S. GDP growth negatively.

The strong outlook for the technology market paradoxically contributed to a less robust outlook for the U.S. economy (para.1). The forecast by the Bureau of Economic Analysis (2011) showed positive numbers for U.S. business investments in technology. The forecast reported an increase in investments and that the decline in 2009 was not as low as the prior data had suggested. Business investments in computer equipment, communications equipment, and software rose by 12% in the second quarter of 2010, following a 10% rise in the first quarter of 2010. The strongest category was computers and peripheral equipment, with 31% year-over-year growth in the second quarter of 2010, 21% in the first quarter 2010, and 13% growth in the fourth quarter 2009. Communications equipment investment grew by 7%, a slowdown from 10% growth in

first quarter. Software investments rose by 8% (see Table 1), the same growth rate as in the first quarter of 2010 ("Accenture on IT Spending," 2009).

Table 1

U.S. Business Investment in IT Equipment and Software Is Growing

% change from prior year business investment in:	Q3 2009	Q4 2009	Q1 2010	Q2 2010
Computers & peripheral equipment	10%	13%	21%	31%
Communications equipment	-9%	2%	10%	7%
Software	-1%	4%	8%	8%
Total	-5%	5%	10%	12%

Note. Adapted from Bureau of Economic Analysis website, 2011.

In addition, revisions to the data on business investment in technology lowered the growth rate in 2008 (from 4% to 2%) but reduced the decline in 2009 (from -9% to -4%). The biggest change came in software, which changed from -8% in 2009 to a revised 0% growth that year. The decline in investment in computer equipment and peripherals was slightly smaller in 2009, down 12% instead of 14%. The main effect of this change was to dampen the growth rates for software investment in 2010 because of a higher base of measurement from prior quarters in 2009 (see Table 2).

Table 2

Revisions to 2007–2009 IT Investment Data Lowered 2008 Growth, Reduced 2009 Decline

% change from prior year business investment in computers, communication equipment, and software	2007	2008	2009
Before July 2010 revisions	6%	4%	-9%
After July 2010 revisions	6%	2%	-4%

Note. Adapted from National Economic Accounts, Bureau of Economic Analysis (2010).

According to Bartels (2010), there was discouraging news in the rest of the GDP report. While the GDP increased by 2.4% (a little less than the assumed 2.8% growth in the July 21 report on the United States and global IT market), personal consumption (which comprises approximately two-thirds of GDP) increased by 1.6% as continued high unemployment rates kept consumers cautious in spending. Strong growth in business fixed investment (17% annualized growth), residential investment (28%), and federal government spending (9.2%) accounted for the strong performance and helped push real GDP growth higher than growth in consumer spending (Bartels, 2010, para. 3). A review by Forester Research (2010) on IT investments showed that there was a $50 billion increase in business fixed investments in equipment at seasonally annual rates adjusted for inflation ranging from the first to second quarter of 2010, respectively. The adjustment was made because of a rise in imports of capital goods that resulted in a drop in net exports of goods to $89 billion in similar terms (Bartels, 2010). According to

Bartels, in the fourth quarter of 2010 government spending would decrease to show a positive direction on business investments. Additionally, Bartels highlighted important factors that could reduce economic growth including weakening home sales and a cessation of the economic stimulus program. Bartels (2010) stated that economic growth rates depend on the consumer's purchases and continuous investment in equipment and software by business leaders.

Competitive Advantage of IT Investment with Firm's Performance

Research conducted in the information systems field about IT investments with organizational effectiveness use transaction cost economics and a resource-based view of the firm to explain and understand the relationship. Transaction cost economics indicated that the organization of economic activity is irrelevant if transaction costs are negligible. Proponents of transaction cost economics stated that any advantage for one mode of an organization that appears to maintain another mode will simply be offset by costless contracting. However, skeptics remain despite the growing understanding that transaction costs are central to the study of economics. Buckley and Michie (1996) indicated that transaction costs economics have a well-deserved bad name as a theoretical tool because there is a suspicion that almost anything can be rationalized by relying on specified transaction costs.

Most researchers indicated that IT could lead to a competitive advantage. Earl (1989) suggested that IT could be a strategic tool in four dimensions: to gain competitive edge, to increase productivity and effectiveness, to adopt a new form of management, and to build new business. However, the paradox that IT could lead to a competitive edge

appears not to be real in the 1990s (Stratopoulos & Dehning, 2000). Willcocks (1992) stated the reason most organizations find it very difficult to invest in IT is that an organization seems not to find enough justification for the investment in terms of profitability. In addition**,** Willcocks stated that the use of IT to increase the competitiveness of a firm has been a major area of interest in the information systems literature.

Information systems research found that IT can increase the sharing of information to make real-time decisions, improve productivity alignment and the quality of the product, address market changes, and improve distribution (Al-Mudimigh et al., 2001; Shin, 2001). In addition, Al-Mudimigh et al. (2001) and Shin (2001) suggested differentiating products, reducing the cost of products or services, providing new and creative products or service, supporting growth, or forming associations with providers and customers to increase organizational effectiveness. However, Love and Zahir (2004) looked at how IT often reinforces and increases business ideas, which help organizations to realize their long-term objectives. Additionally, IT deployment oftentimes resulted in organization changes. However, when new technologies replace old ones, sometimes expected business profit are not achieved (Love & Zahir, 2004). Despite increasing expenditure on IT, productivity may not increase, and this situation has given rise to a productivity paradox (Love & Zahir, 2004).

Most of the research findings on IT investment seem to include divergent opinions on the value created by IT. Some researchers, including Love and Zahir (2004), believed that IT creates value and would invest more in it, but some researchers do not

see any justification to invest in IT. For example, the initial excitement for IT or information systems in the 1970s and 1980s has done better in the practical sense rather than theories (Serafeimidis & Smithson, 2000). According to Calderia (1998), IT management search for enough proof of the business value for information systems and IT investments (Serafeimidis & Smithson, 2000). Caldeira (1998) asserted that even with large investments in IT by private and public sector, a clear lack of proof exists regarding the effect on productivity and business effectiveness on the IT investment paradox.

The Information Systems Paradox

In the past, more emphasis focused on the effect of IT investment and its justification. However, researchers on many occasions produced contradicting or varying results. Some examples show the successful effect of IT investment justification. This success has formed the key areas in organizational investment strategies (Kivijarvi & Saarinen, 1995). However, many experimental studies have failed to come up with any positive justification on IT investment for infrastructure, according to Kivijärvi & Saarinen (1995).

Further, there has been varying proof on whether IT spending has resulted in business value at organizational or economy levels. The statistical unknown contributes to ongoing business concerns about how the value of IT spending can be quantified (Farbey et al., 1999). A favorable percentage of new, organizational, economic resource investment is spent on IT, directly or indirectly. Organizational leaders want to be sure that IT investment is justifiable, according to Farbey et al. (1999). Justifying spending on IT has been an ongoing problem, and managers have aired concerns about the value of IT

investments; however, leaders have been looking for ways to examine and justify the use of IT (Al-Yaseen, H., Al-Gweri, A., & Al-Jaghoub. S. 2007; Al-Yaseen, Eldabi, Lees, & Paul, 2006). Unchanged increases in IT investments, coupled with ongoing needs for justification, require an explanation from the information systems technology society. It is important that the competitive advantages from quality IT investments be generally identified (Brynjolfsson & Hitt, as cited in Peppard & Ward, 2004).

Some researchers have revealed that it is not likely that higher spending on IT alone will result in quality performance and real benefits received on IT investments (Harris & Katz, 1989). The highest profits of IT appear to be realized by organizations when IT investment is joined with other independent investments, such as organizational restructuring, reengineering, and redesign (Lee & Bose, 2002). Information systems or IT investments may not immediately improve financial effectiveness; instead, it is one important means but needs to be joined with other organizational factors such as business strategies (Shin, 2001). While early IT implementations were clearly focused on the automation of clerical and repetitive tasks, the proactive search by organizations for opportunities to leverage IT for business advantage began in the late 1970s and early 1980s. However, it is widely accepted that the evolution of IT in organizations to date can be captured in three eras: data processing (DP), management information systems (MIS), and strategic information systems SIS (Somogyi & Galliers, 1987, p. 8).

According to Somogyi and Gallier (1987), each era displays distinct characteristics regarding the application of IT and has different objectives—although the objectives of the data processing DP and management information systems MIS eras are,

strictly speaking, a subset of the SIS objective to improve competitiveness. In the modern competitive environment, many executives make IT investments to increase efficiency and effectiveness, not for gaining competitive advantages alone. Peppard and Ward (2004) considered the three-era perspectives criticized as over-simplified.

The review of Francalanci and Galal (1998) found that the old IT productivity paradox noted a direct casual relationship between IT investments and firm performance. In fact, the productivity was viewed as against benefits because of positioning between managerial decisions and technological choices. According to the Francalanci and Galal, by not including other important organizational variables and detailed models of justification, it could be susceptible to inaccurate findings.

In addition, researchers at the firm level have shown that IT investment has meaningful results on the levels of productivity, growth, stock market value of organization, and also on internal effectiveness measure such as goods turnover (Hitt et al., 2002). Indeed, researchers saw a meaningful relationship between IT expenditure and productivity, while others were still unable to recognize productivity benefit from IT. The IT Investment, Stakeholder's and Firm Performance (2006) research conference has put forth many clarifications for the apparently inconsistent findings, but little has been done to recognize the status under which organization leaders should require IT investments. Moreover, researchers have not been able to conclude that IT expenditure by an organization resulted in increases in major performance indicators (Sircar et al., as cited in "IT Investment, Stakeholder's & firm Performance," 2006).

Alignment of information systems (IS) strategy with business strategy is an important objective when organizations consider the effective use of IT resources. Alignment is especially important for executives in firms that use IT as a strategic resource. The study of the alignment practices of an organization offers insight into how effectively IT has realizes organizational objectives. Peppard and Ward (2004) stated, "the central message from the research literature, and one that is universally accepted, is that technology itself has no inherent value and that IT alone is unlikely to be a source of sustainable competitive advantage" (p. 169). The business value derived from IT investments only emerges through business changes and innovations, whether they are product or service innovations, new business models, or process changes, and organizations must be able to assimilate these changes if value is to be ultimately realized. This point is well understood and reflected in the nature of IT investments made by most organizations in the 1990s. Consequently, the focus has been mainly on a combination of redesign, reorganizing, rationalizing, and integrating internal processes using new software suites and increasing connectivity with consumers, customers, suppliers, and other trading partners to reduce the cost of business transactions and improve, develop, and create relationships via IS or IT (Pappard & Ward, 2004, p. 169).

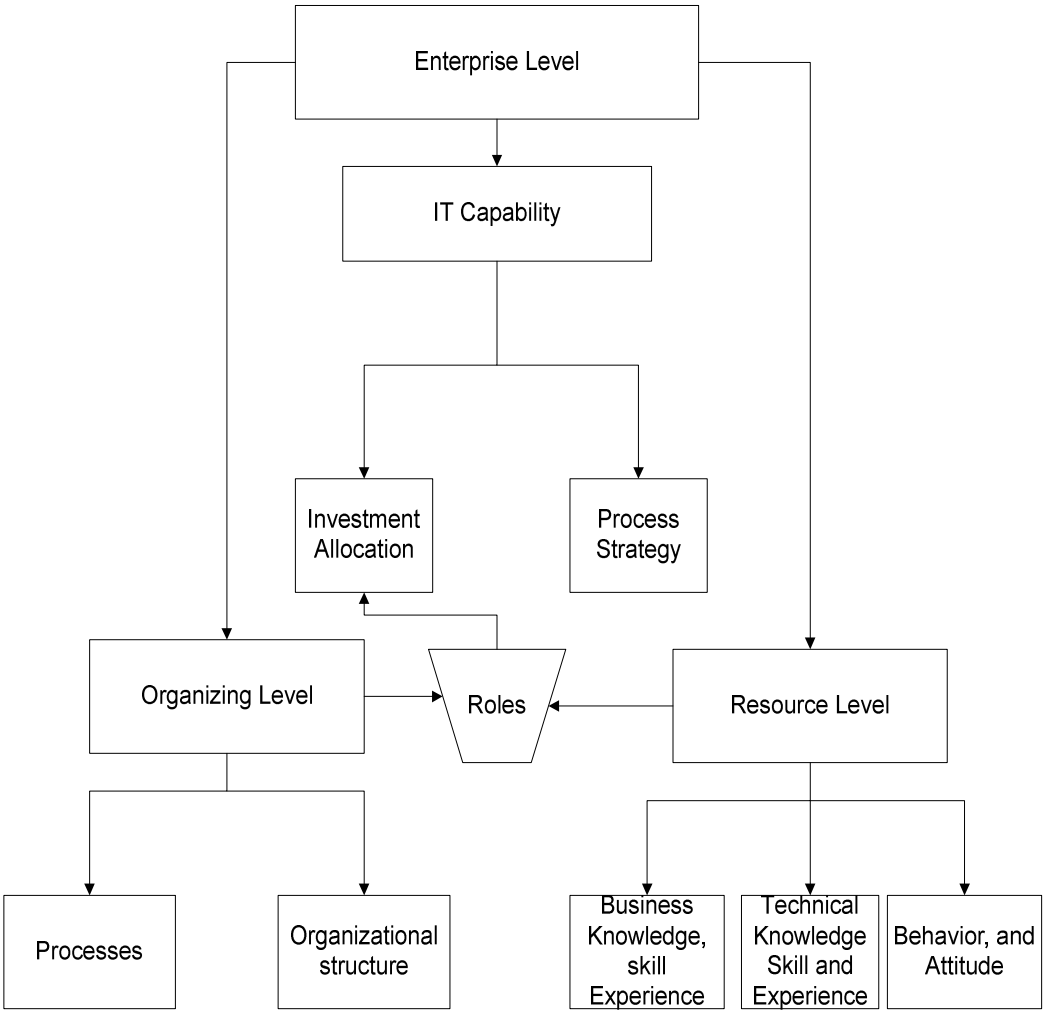

Figure 2. Revised information systems capability model. Adapted from "Beyond Strategic Information Systems: Towards an IS Capability" by J. Peppard & J. Ward, 2004, *Journal of Strategic Information Systems*, *13*, p. 167–194. Copyright 2004.

The expression of a particular competence in an organization depends on people applying their knowledge, integrating their knowledge, interacting with others, and coordinating their actions. These employees express such competence by performing roles in organizational structures and processes. Individuals can, of course, contribute to a number of the IS competencies: "A competence is an emergent property of organizational processes" (Peppard & Ward, 2004, p. 180). Peppard and Ward's model was a systems

thinking approach, which guides organizations to a better performance. As illustrated in Figure 2, at an organizational level, there are three different levels, which include: enterprise, organizing, and resource levels. However, if all these three levels are combined as one unit; the output will be IS capability, which drives the organizational performance.

Appel et al. (2005) on the justification of IT investments on corporate performance determined the winners and losers on IT investment within organizational environment. McKinsey compared IT spending as a percentage of revenues and total returns to shareholders. Appel et al. (2005) compared two recent studies of 192 companies for more than 10 years, from 1991-2001. In this study Appel et al. found that each company has an average IT expenditure and average return on investment. The result reflected that spending on IT alone did not drive improvement. In order words, IT investment levels do not correlate meaningfully with financial returns. Further, out of 93 companies that spent more than average on IT, 50 were performance winners while 43 lost value. Appel et al. (2005) stated that the findings indicated that the winners won because they excelled at choosing and managing organizational IT investments (para. 5).

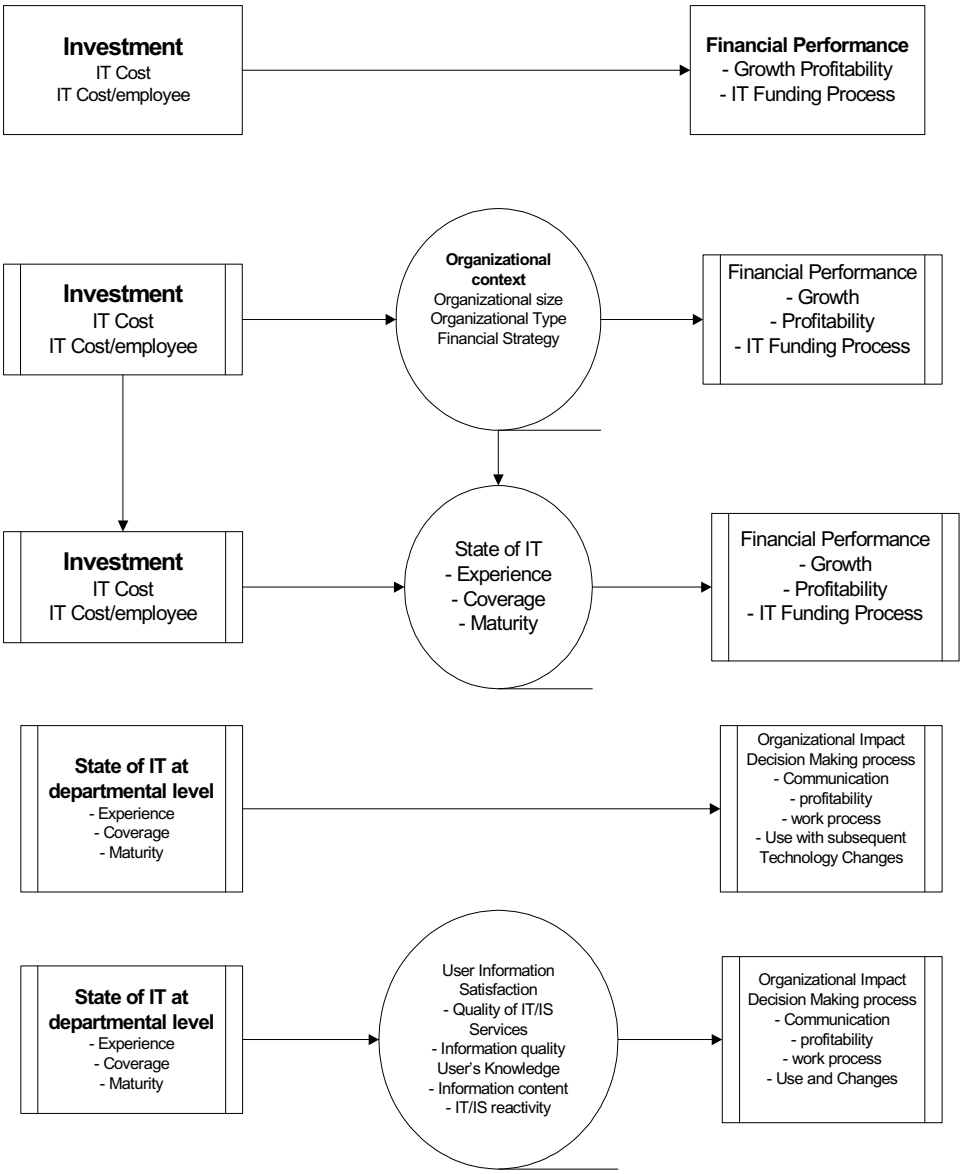

Figure 3. The incremental evolution of research model. Adapted from "Investment in Information Systems, and the Financial Performance of the Firm" by T. Saarinen & H. Kivijarvi, 2001, *European and Mediterranean Conference on Information Systems Journal.* (28) 143-163.

In many organizations, IT applications can be examined as an exceptional case from investment standpoint. According to writing on investment, or the capital budgeting literature, there are many possible performance matrices for investment assessment and control. The many possible matrices illustrate that it is possible to combine IT investment with the goals of an organization. In addition, the performance matrices assumed that all results of the investment can be intersected, quantified, and changed into monetary units. Nonmaterial costs and income from business are assumed by managerial standpoint to be zero. From a theoretical point of view, the assessment problem appears to be that the selected standard for the investment in IS should be promising if examined with the other investment options (Saarinen & Kivijavi, 2001).

The need to cut costs on IT investment has shifted some organizations toward investing in cloud computing. Al-Noor Ramji, executive vice president and general manager of Misys, noted, "The combination of Bank Fusion, the most latest financial services opportunities on the market today, and the innovative Windows Azure Cloud computing infrastructure is world-beating," (quoted in Ballmer, 2010, para. 5). Ballmer (2010) noted a new change in the computing industry that could reduce operational costs within banking firms. Ballmer stated that the new solution will be to process data in the cloud. According to Ballmer, cloud computing enables banking industry officials to benefit from increased agility with lower risk. In addition, cloud computing could provide extraordinary speed as well as adapt to change with access to the latest solutions. Hence, the idea lets banks focus once again on the business of banking (Ballmer, 2010). The new idea of the cloud infrastructure builds on business essential to the success applications

level development associated with Misys' banking and capital markets application through the windows Azure cloud platform. Al-Noor Ramji perceived that technical combination with Microsoft in delivering cloud infrastructure will help the financial institutions. However, the choice of being able to adapt to the new change to maximize the return on the IT investment will be left with managers. Additionally, Al- Noor Ramji believed that cloud computing could carry innovation services to customers faster than the physical storage systems being use (Ballmer, 2010).

According to Ballmer (2010), the leaders of financial institutions depend on a large number of applications and systems joined with clients, business associates, and outside financial networks. Managing these applications requires a complex data center and support systems. Cloud computing, and explicitly Windows Azure, enables bank officials to move from a capital cluster cost model to one in which the cost is based on the use of the technology. Ballmer asserted that bank officials will not need to buy additional computing resources because the scale of the Azure platform allows high volume workloads such as end-of-day processing to be consumed on demand.

Misys and Microsoft successfully have deployed instances of the Misys Bank Fusion Universal Banking solution to the Windows Azure platform. The Misys solution is built on advanced Bank Fusion technology, which complies with a rigorous set of standards but is unrestrained by privately owned infrastructure, which makes it possible to run the solution in the cloud. Both companies have received interest from banks looking to reduce the complex nature of businesses and operational risks by running their banking systems in the cloud (Ballmer, 2010). In another report reviewed by Ballmer,

Nelsestuen, senior research director of Tower Group, observed globally that many bank officials face high demands for technology innovation, variable services across business unit to withstand the competition, and marketplace forecast. Hence, smaller banks have seen the need and value to invest in operations and processes as well as technologies that make them adaptable to change and operate faster.

Regardless of size, financial institutions need to work to improve functions while not losing sight of the objective to manage costs closely (Ballmer, 2010). Tower Group officials have seen an increasing curiosity or concern about the inconsistent cost models and on request service models, such as those in cloud computing or newer forms of managed and divided services, and outsourcing across different technologies and services. These upcoming approaches offered officials at large banks the opportunity to power scale while smaller banks could compete efficiently through shorter time to market and lower upfront investment (Ballmer, 2010).

The partnership between Microsoft and Misys showed that the financial services industry is now moving to the next group of contemporary banking platforms. Officials of many financial organizations already run finished services in the Cloud such as Microsoft Exchange, Office, and Dynamics CRM Online solutions. This news extended the Microsoft Cloud function to banking applications (Ballmer, 2010).

Cost Model of Cloud Computing Infrastructure

According to Staten (2011), the cost model of cloud computing is based on a per hour rate. The cloud computing infrastructure enables the use of more resources per hour, which is attributed to high performance computer (HPC) workloads. According to Staten,

cloud economics can mobilize all HPC workloads. In addition, Staten stated that ROI of the cloud computing depends more on how the clients' application scales and how quickly clients can go into and exit the cloud.

The three ways by which companies deploy or enable IT infrastructure to support innovation include the following: (a) turning raw data into insight, (b) supporting rapid experimentation, and (c) developing a Web 2.0 interaction model. According to Roberts, Sarrazin, and Sikes (2010) the relationship between IT investment and organizational gains has not been clear to IT leaders. Additionally, managers believed that the only leeway was to hire competent IT personnel by investing more resources and hoping for the best. According to Roberts, Sarrazin, and Sikes, the economic downturn of recent years has made different executives rethink their fundamental role on IT spending. Further, it appears that managers often focus on the need for IT applications rather than cost. For example, turning raw data into insight means that as the volume of the data increases, it becomes more taxing to track, filter, and analyze the organization's information as well as turn it into useful, implementable insights. In addition, organizations that invest in effective information systems have an advantage of finding new opportunities as well as reacting quickly to unexpected changes. A typical example is developing an IT infrastructure for electronic health records and prescription data for the pharmaceutical companies. Additionally, such system development helps in structuring and mining the information for patient compliance trends.

Supporting rapid experimentation in IT infrastructure especially in the health care organization helps to avoid errors. The organization measures the outcomes and includes

lessons learned into the teams' overall leaning objectives. This type of application as observed by Roberts, Sarrazin, and Sikes (2010) has been adopted by capital one for their credit card services and Google for online services. The third infrastructure is the web 2.0, which has shown historic achievement on automating high-speed transaction for enterprise resources (ERP), supply chain management and customer relationship management (CRM). According to Roberts, Sarrazin, and Sikes attention has moved to lightweight web 2.0 tools to assist organizations with many diverse transactions.

Summary

The subject of this review was how managers justify investments in IT infrastructure as well as the relationship between organizations and IT. Some of the subject areas explored were (a) the literature search strategy, (b) a review of the globalization, demographic shifts, and increasing internationalization of IT, (c) organizational performance, (d) analysis of the contradictory findings, (e) IT, business values, and intangible benefits, (f) the effect of information systems on organization and market, (g) critical analysis of the literature, (h) commentary on U.S. IT spending reaching $568 billion in 2010, (i) the competitive advantage of IT/investment with firms performance, (j) the IS paradox, (k) IS strategy, and (l) the relationship between business process reengineering (BPR) and IT. Each of these subject areas addressed some of the issues concerning the IT investment as well as the intangible benefits realized from creating IT infrastructure. Further, the application of cloud computer technology and how different organization can benefit from implementing such IT infrastructure were discussed. Finally, this chapter ends with how companies deploy and enable IT

Infrastructure to support Innovation and growth. Chapter 3 of this paper covers research methodology.

Chapter 3: Research Method

The purpose of this study was to investigate how managers justify investments for IT infrastructure in one city in the United States. This chapter covers the research design, target population, sampling procedure, sample, treatment, instrumentation, data-collection techniques, data-analysis techniques, reliability, and validity.

Research Design and Approach

I used a case study design for this investigation of how managers justify investments in IT infrastructure. This qualitative research approach draws out hidden explanations of social behavior to find the detailed *why* and *how* of the phenomena being studied (Yin, 1984). I selected a case study design because the research questions call for a rich understanding of the attitudes of managers toward the IT investment. I used several theories to develop the inquiry, including organization-performance theory and complementary-asset theory. The case study design approach adopted for this research study aids in the understanding of real-life phenomena, but such understanding helped to investigate how managers justify investments in IT infrastructure. However, Creswell (2007) asserted, "Case study research is a situated activity that locates the observer in the world, and consists of a set of interpretive, material practices that make the world visible" (p. 36).

Denzin and Lincoln (as cited in Creswell, 2007) also stated that qualitative research is an interpretive and naturalistic approach to the world. This statement means that case study research focuses on studying subjects in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them.

The investigation into how managers justify investments in IT infrastructure focuses on learning the meaning participants have about the problem or issue of investments in IT infrastructure.

Murphy et al. (1996) stated that in organizational theory, three fundamental theoretical approaches to measuring organizational effectiveness have evolved: the goal-based approach, the systems approach, and the multiple-constituency approach. The goal-based approach involves evaluation of the goals an organization's leadership sets for the organization and the organizations effectiveness. Proponents of the systems approach view the organization as a simultaneous achievement of multiple, generic performance aspects that are a representation of financial performance. Proponents of the multiple-constituency approach ask questions including: Is there anything the goal-based approach and the systems approach fail to account? This action is operational performance.

Case study research is used as a design for the researcher to acquire an understanding of how managers justify investments in IT infrastructure. In fact, the use of case study approach for this research is to extend experience or add strength to what is already known through previous research (Yin, 1984). In addition, the case study approach is used to emphasize detailed contextual analysis of a limited number of events or conditions and their relationships for this study. Yin (2009) stated that case study is preferred when examining contemporary events, when the relevant behaviors cannot be manipulated such as investment justification in IT infrastructure. Furthermore, Yin (2009) asserted, "Although, case studies and histories can overlap, the case study's unique strength is its ability to deal with a full variety of evidence-documents artifacts,

interviews, and observations beyond what might be available in a conventional theoretical study" (p. 11). I will use a single, case study to conduct and define research questions, which will be reflected in chapter 4. According to Yin (as cited in Baxter & Jack, 2008), a case study design should be considered when: (a) the focus of the study is to answer *how* and *why* questions, (b) researchers cannot manipulate the behavior of those involved in the study, (c) researchers desire contextual conditions because it is believed they are relevant to the phenomenon under study, or (d) the boundaries are not clear between the phenomenon and context. For example, a study of the decision-making of nursing students conducted by Baxter (2006) was used to determine the types of decisions made by nursing students and the factors that influenced the decision-making. According to Baxter, a case study was chosen because the case was the decision-making of nursing students, but the case could not be considered without the context, the School of Nursing, and more specifically the clinical and classroom settings. It was in these settings that the decision-making skills were developed according to Baxter. In this research study I considered the three IT companies designated as A, B, and C as the context for this study.

Further, a qualitative case study was chosen instead of ethnography because ethnography requires the researcher to be grounded in cultural anthropology and knowledge of social-cultural systems. In addition, ethnography requires extensive time to collect data (Creswell, 2007). Grounded theory was also not selected for the study because it requires several theoretical ideas, and the researcher faces the problem of determining when categories are sufficient or well detailed. In phenomenological

research the researcher needed to have an in-depth understanding of participants lived experiences. Narrative research may not contain the strong cultural issues of the subject presented in the study. For example, the researcher may tell story of an individual as a central focus for the study, and the data collection composed of conversation or stories (Creswell, 2007). A quantitative method was not selected because quantitative measures cannot adequately describe or interpret how managers justify investments in IT infrastructure. Mixed methods were not selected because the researcher does not need to use a quantitative approach—the qualitative approach by itself is appropriate.

Specifically, in this study, I applied the triangulation approach. It involved two groups that were formally interviewed and a third engaged in focus group discussion. That is, the study used three groups of participants: two interview groups and one focus group to make triangulation possible. Triangulation is a method or process for using different methods or approaches to solve research problems. Singleton and Straits (2010) noted triangulation is a condition in which two or more dissimilar measuring instruments or methods are used to analyze research. In addition, triangulation is a method using different approaches to multiple sources of error, increasing confidence in research data because the strength of one method offsets the weaknesses of another method (Singleton & Straits, 2010). However, Creswell (2007) addressed the triangulation concept as developing many perspectives regarding the importance of validity in qualitative research.

According to Creswell (2007), these perspectives are viewing qualitative validation in terms of quantitative equivalents, using qualitative terms distinct from

quantitative terms, employing postmodern and interpretive perspectives, considering validation as unimportant, and combining, or synthesizing many perspectives.

Setting and Sample

The setting for this study was midsize IT companies in one city in the United States. The criteria for selecting these companies were that they must be situated in the same city in the United States and have been in business for at least 10 years. The specific companies, denoted as A, B, and C for the purpose of anonymity, were selected for this study because of the nature of their leaderships' investments in IT infrastructure. Moreover, these organizations have had several organizational and technological changes. The sampling was purposeful, and targeted a minimum of 15 managers selected from A, B, and C in equal proportion (5 from each). The situation under study called for understanding on how managers justify investments in IT infrastructure, and whether the attitude of management staff or lack of organizational performance motivate managers to invest in IT infrastructure.

Population

A research population is a well-defined collection of people or objects showing similar characteristics or trait. The population under investigation in this study was managers from midsize companies within a specific city in the United States. These managers must come from the IT departments of their organizations.

Sampling Procedure and Sampling

The sampling procedure used in this study was nonprobability sampling with a purposive sampling technique. Purposive sampling shows characteristics of particular subgroups of interest and facilitates comparisons between the different groups.

According to Singleton and Straits (2010), purposive sampling is hardly looked upon as a suitable substitute for probability sampling especially in situations in which precise and accurate generalizations are required. The major weakness of purposive sampling is that making an informed selection of cases requires considerable knowledge of the population before the sample is drawn (Singleton & Straits, 2010). In general, nonprobability methods such as purposive sampling tend to suffer free from bias. For example, participants may be chosen out of convenience or from recommendations of knowledgeable people (Tangco, 2007). However, for studies with more limited scope or in situations that preclude random selection, purposive sampling is an acceptable alternative. In fact, data collected from purposive sampling may still be valid for certain studies. When a sample is representative, it becomes valid in the population it represents, providing external validity. According to Tangco (2007), "When a sample is measured correctly, it becomes valid for the sample, thus providing internal validity" (p. 153). Nonprobability methods are used to contribute to internal validity more than to external validity. In purposive sampling, interpretation of results is limited to the population under study. To be valid over a larger population or to form the basis for a theory, the study must be repeated for confirmation in a different population using a probability method (Bernard, 2002). It is always important to state the potential bias when the results are

analyzed and interpreted to prevent the possibility of misleading people into inferring general conclusions (Bernard, Godambe &Snedecor, as cited in Tangco, 2007).

According to Tangco (2007), regardless of inherent bias, purposive sampling can provide researchers with reliable and robust data, and the strength of the method is in its intentional bias (p. 154). Campbell (1955) conducted a study wherein he took purposive samples and compared them with a survey of all crewmembers regarding morale. Results of both methods were highly correlated using Spearman rank-order correlation. Tangco (2007) stated Karmel and Jain compared the results of a model-based purposive sampling method and a random sample with the intention of advocating random sampling. To their surprise, the purposive method did better than the random method, encouraging statisticians to look beyond random sampling designs (Tangco, 2007, p. 154).

As stated earlier in this chapter, under the section of research design and approach, this study applied the triangulation design involving three groups of participants. Each of these groups was represented by a single midsize company located in a particular city in the United State. The three companies were selected purposively from the many companies in this city. They were selected because the businesses the companies operate correspond to key population differences such as nature of the business and the duration of existence. In addition, these companies have been involved in huge technology investments and organizational changes. From each of the three companies, five individual managers from their respective IT departments were selected using the same approach, for a total of 15 IT managers in the entire study.

Data Collection and Analysis

In this study, the primary data collection technique consists of two in-depth, semi-structured interviews of managers selected from two companies using an electronic questionnaire and one focus group discussion (see Appendix A). The strategy was to interview five managers each, selected from the IT department of two midsize companies, and to use the remaining five managers from the third company as a focus group to make triangulation possible. The data was analyzed through the process of coding as well as identifying themes and patterns. Inductive coding was used as well. The transcribed data was carefully examined to understand their meaning. Then data was segmented into symbols, categories names, and described the data in words. The data segments of the text in transcript helps to assign a code or category name. Permission was granted to use the facility space for data collection in the focus group (see Appendix E).

Data Collection Techniques

The data collection involved three organizations A, B, and C and they were purposefully selected. These three organizations signed a letter of cooperation before the data collection process began. The ethical implication for the data collection includes disclosing organizational data to the public made to be private, and protecting participants' information from the public. The participants were assured that the data will be highly confidential and secured where no one other than me will access it. The data collection process involved a pilot study where two managers were asked to validate the research questions before the main data collection began and were exempted to participate from individual interviews to avoid bias. After the research questions' validation, there were no changes in the manner the research questions were framed. Data was collected from individual questionnaires, and distributed in electronic format. In addition, the focus group session was used to collect data as well, for triangulation purposes.

The questionnaire used for the data collection for individual interviews was distributed with the qualtrics survey tool, and received feedback. The qualtrics survey tool is analytical software used to collect and organize survey data, and it was very helpful in the organization of the data. Qualtrics survey tool stored the responses in a secured file, and encrypted the file with a password that made it difficult for another person to gain access to the data. The program helped to organize the data according to dates and time the data was received.

Data Analysis Technique

According to Miles and Huberman (1994), the process of data analysis involved writing marginal notes, drafting summaries of field notes, and noting relationships among categories, all of which the current researcher will discuss in chapter 4. In this study, there were two types of data coding used in the analysis: open coding and axial coding. The open coding process was used to ensure that the data transcript was validated and coded the concept found in the data after the data collection. Axial coding was used to ensure that data were organized into themes and made the data more abstract. The next step was to represent the data in figures, tables, or discussion. The strategy includes summarizing field notes, working with words, identifying codes, reducing codes to themes, and relating categories to the analytic framework in the literature. The data collected during the focus group session was triangulated with the individual interviews.

Verification of Qualitative Data

According to Creswell (2007), an ironic validation is one in which the researcher presents truth as a problem. In qualitative research, reporting accurate data has become an issue. I used validation procedures to verify the data as suggested by (Creswell, 2007). I triangulated the data obtained from the interviews with the data obtained from the focus group. Another procedure I used to verify the data was the research auditing. According to Creswell (2007), the qualitative researcher looks for conformability rather than objectivity in establishing the value of data, which could be done through an audit process. The audit process examines the extent to which the data collection and analysis techniques are competently applied in this research study. The information collected for

this study is recorded in the database. According to Creswell (2007), computer programs are used to help store and organize qualitative data (p. 168). In this research study, a detailed description of how managers justify investments in IT infrastructure and the analysis of data collected will be discussed. Triangulation strategy was used in this research to validate the data as stated above. For example, multiple data collected from different sources include interviews with individual managers and one focus group.

Instrumentation and Material

The instrument that was used for data collection was a self-designed questionnaire composed of 10 interview questions. These questions were divided into two groups based on the main research questions, designated as RQ1, and RQ2. The set RQ1 included interview questions ranging from 1 to 6 and RQ2 ranging from 7 to 10. These questions were segmented because RQ1 questions looked at how managers justify investments in IT infrastructure, and RQ2 questions looked at the benefit side of the investments in IT infrastructure. The three companies noted as A, B, and C used the same questionnaire for the data collection except that company C was designed for the focus group discussions. I used the Qualtrics survey tool to distribute the questionnaire to Company A and B respectively. The Qualtrics survey tool is an analytical software program that collects and organizes survey data. The focus group session involved five participants. Within this group, one person was the moderator, and another person was the note taker, and the other participants discussed extensively their experiences on how managers justified investments in IT infrastructure in their various organizations. Self designed Matrix form was used for the focus groups to collect the data. The focus group session lasted for 20 to

30 minutes. The same questions that applied to A and B were presented by the moderator, who was exempted from answering. The discussion was designed in a manner that all the participants answered the questions except the moderator and the note taker.

Reliability and Validity

To ensure reliability and validity, a pilot study was conducted to validate the interview questions before the data for the research study began. Additionally, this was to ensure that the consistency with which the questionnaire was answered remained relatively the same. The pilot study was conducted through an electronic interview with two participants selected to validate the questionnaire (see Appendix A).

Protection of Participants

To protect the participants in the proposed study, the researcher provided a consent form. In addition, the researcher assured the participants that nothing related in their personal information were disclosed including their names, places of work, and addresses. Further, the steps used to protect participants included: (a) an approval from IRB (institutional review board: approval number: 12-05-11-0048079) before the data was collected, (b) the participants signed the consent form, and (c) the participants had the option of opt-in or opt-out at any time they feel discomfort about the study without any obligation as stated in the consent form. This study does not involve more than the minimal risk of harms that go beyond the normal daily experiences in life, all participants signed the confidentiality form before the data was collected. The benefit for participating was that participants received a summary of the findings, and $5 Starbucks coffee gift card (see Appendix I).

Dissemination of Findings

Findings were distributed in summary form to participants. In addition, findings were published in the ProQuest database in dissertation form. Finally, the findings were published in online journals and at professional conferences.

Summary

In this section, the research method and design I used to understand how IT investment contributes to business value was described. In many articles in the literature review, researchers asserted that IT contributes to business value; however, researchers have yet to understand the metrics used to calculate the return on IT investment in an organization. The interaction between IT resources and users provides better insight into the potential benefits of IT investment. Furthermore, in the first chapter, I described the research design used to address the issue of IT investment. In addition, in this section, I stated why the case study was chosen as the preferred design before other methods. Also the target population and population setting, sampling procedure, sample, instrumentation, data collection procedures, and data analysis procedures were identified. Chapters 4 and 5 present and interpret the findings of the study.

Chapter 4: Results

The purpose of this chapter is to report the research findings from an investigation of how managers justify investments in IT infrastructure. In addition, the questionnaire responses and analysis of documented evidence obtained from the investigation is presented. The research used a case study design approach. The data collected through interviews and focus groups were analyzed, and classified into themes. The findings of the case analysis are described in this chapter.

Findings

The findings are presented as themes within the research questions. Interview questions were derived from the research questions and participant responses to these interview questions were coded and analyzed to identify themes. Study participants are identified as Person A, Person B, and Person C respectively. For example, CAPA means company A Person A and CAPB means company A person B, and so on.

Research Question 1

How do organizational leaders justify investments in IT infrastructure? This question explored the processes managers consider during investments in IT infrastructure, which was the fundamental focus of this research study. This research question was addressed by Interview Questions 1-6. These questions can be found in the data collection instrument (see Appendix A). The data analysis identified the following themes as shown in Table 3. The data were quantified into percentages by dividing the number of interview responses by the total number of participants, and multiplied by

100% for tractable analysis. For example, the three midsize companies: A, B, and C composed of 5 participants each and have a total number of 15 participants in all.

Theme 1: ROI justification.

ROI justification was found from analyzing the responses. That is, in analyzing a set of responses to the interview questions comprising a research question, Theme 1 is illustrated in Table 3.

Table 3

ROI Justification

Companies	Participants	Responses
Company A	Person A-CAPA	They always look at their ROI (Return on Investment) and calculate their expenses and gains.
Company A	Person B CAPB	Through return on investments, increased productivity, and simplified business processes.
Company A	Person E-CAPE	My organization uses ROI model to justify investments in IT infrastructure.
Company A	Person D-CAPD	Return on investment model is often used to justify investments in IT infrastructure. In addition, stated "Although there are other methods, which am not sure at this time."
Company B	Person E- CBPE	The justification based on the ROI.

Managers perceived that ROI is the best approach to justify investments in IT infrastructure as shown on Table 3. The interview data revealed that about 33.3% of the participants used the ROI model to justify investments in IT infrastructure. Although, Wessels (2003) found that an implication of using ROI model was the lack of sufficient

evidence to account for the intangible benefits from IT investments. Stewart (2011) noted in his literature that the best evaluation of a firm's profitability was not just the measure of ROI, but firm's learning experiences that produce investor's value over the measurement period. From the onset of this study, the researcher thought that ROI was the standard model used to justify investments in IT infrastructure as earlier researchers on this topic indicated in their literatures. However, the data collected from interview revealed that only 33.3% of the participants used ROI, whereas 66.6% of the participants used alternative approaches to justify investments in IT infrastructure. The data collected from company C for example, were inconclusive on the use of ROI to justify investments in IT infrastructure (see Appendix B). For example, from the data collected from CCPC; the perception of the participant appears that justification depends on the business model the organization has adopted. In order words, the justification of investments in IT infrastructure could be dynamic, and not been viewed from only one perspective per-se.

Theme 2: Cost justification.

The cost justification theme was found from the data collected from interview responses linked to research question 1 as shown in Table 4. The data revealed that investments in IT infrastructure have played a vital role in these midsize organizations. However, the perceptions of the participants appear that more value would be created, if the cost is considered in the process of justifying investments in IT infrastructure. From the researchers' point of view, the cost consideration of investments in IT infrastructure would be the calculation of the total revenue minus expenses incurred during the investment period. However, the profit of an IT investment may not be significant

without the consideration of the cost implication of the IT project. In this theme, data were quantified into percentages by dividing the number of responses by the total number of participants as indicated earlier. Then, multiply by 100% for tractable analysis. The data for cost justification is shown on Table 4.

Table 4

Cost Justification

Companies	Participants	Responses
Company B	Person C-CBPC	They measure the return on investment and offset it with cost for the investment.
Company B	Person D-CBPD	The organization always considers cost in justifying investments in IT infrastructure.
Company B	Person E-CBPE	The organization considers the need for infrastructure investment, and look at the cost, and ROI of the IT project.
Company A	Person E-CAPE	The organization uses cost-benefit analysis.
Company A	Person D-CAPD	The organization quantifies and justify IT investment in infrastructure by benefit against cost.
Company C	Person B-CCPB	Through the cost, of maintaining the existing infrastructure vs. upgrades or building a completely net scalable infrastructure better meet up with technology.

The data collected from Company B, revealed that about 20% of the participants believed that cost reduction was a process used to justify investments in IT infrastructure in the organization. Hesitantly, 13.3% of the participants from Company A believed that cost was the approach to justify and quantify investments in IT infrastructure. In fact, only 6.6% of the participants in Company C perceived that cost was appropriate as an approach to justify, and quantify investments in IT infrastructure. Based on the

researcher's perception, managers in these companies believed that the lower the cost of an IT investments project, the lower the expenses incurred. Moreover, value can be created by adopting economic value added (EVA) of an IT investment. The EVA in this case could mean the operating profit of the IT investment after tax, and minus expenses on the IT capital invested. Stewart (2011) perceived that EVA and not ROI can be applied to determine whether a firm or its business units are adding value to the investor's wealth. As noted also in this study, senior IT managers perceived that insufficient benefits from IT investments were concerns. It could be that cost was one of the factors that negate the benefits of an IT investment in Infrastructure. Approximately 40% of the participants in this study perceived that the cost model is an appropriate approach to justify investments in IT infrastructure as shown in Table 4.

Theme 3: Mixed perspectives.

This theme was found based on the interview responses, and linked to research question 1 as well. In fact, this theme has diverse perspectives on how managers justify investments in IT infrastructure as shown in Table 5. The interview responses from the participants in these midsize companies acknowledge the importance of investments in IT infrastructure. However, appears to have commonality, and differences in their perspectives. The commonality was found in CBPA, and CBPB in the use of infrastructural audit although, the wording was different. For example, the data from CBPB asserted, "The organization requests from internal users to perform their daily operations and future needs, "whereas CBPA uses process of periodic review, and

infrastructural audit. In all, both meanings may construe to be the same. The mixed perspectives' data are shown in Table 5.

Table 5

Mixed Perspectives

Companies	Participants	Responses
Company B	Person A-CBPA	Periodic reviews and infrastructural audits.
Company B	Person B-CBPB	Through Budget cycle. The organization requests from internal users to perform their daily operations and future needs. All requests are entered in the system for IT Service and go through an approval process.
Company A	Person C-CAPC	Life cycle program, Upgrades, technology design, marketing, and customer services.
Company A	Person D-CAPD	One process is by calculating return on Investment ROI, which is speed, and efficiency against cost for the investment.
Company C	Person C-CCPC	The process of IT investments is not easy to understand, and there should not be any process identifications, but depends on the business strategies of the organization.

This theme had mixed views on the process used to justify investments in IT infrastructure as indicated earlier. The data collected showed that this theme believed to use different approaches to justify investments in IT infrastructure. For example, the data collected from CBPB indicated that results could be achieved by applying the method of periodic review and budget cycle. The data obtained from CAPC revealed that the organization use life cycle program to justify investments in IT infrastructure. In addition, stated that upgrading the technology design would possibly yield profit to the

organization. In any case, it could be that CAPC considered life cycle program because it helps to determine the systems requirements of an IT infrastructure project. For example, the stakeholders in the investment project would want to know: the user of the system, how the system would be used, the data input and output of the system, and so on. To say the least, analyzing these project requirements before the investment in IT Infrastructure begins would save money to the organization. Alternatively, the data collected also from CAPD showed that return on investments and intangible benefits such as speed and efficiency are factors that were considered to evaluate the payoffs of investments in IT infrastructure. In fact, data collected from CCPC had a different perspective from CAPC and CAPD respectively. To say the least, CCPC perception was managers could use any approach best fit within the organizational context that produces result, and not being rigid. The three midsized companies under study had gone through organizational restructuring, and technological changes, but possibly lacked the process of evaluating the pay offs of IT investment. This was the major problem of this research study. Although, about 93.3% of the participants believed that the intangible benefits realized from IT investment such as efficiency, competitive advantage, high productivity, and efficient customer services was the driver for the investments.

Theme 4: Investment tracking.

The data collected shows that the three midsize companies in this research study have different approaches and similarities to track their investments in IT infrastructure. This theme was discovered based on the data collected from interview responses. At the beginning of this research study, data obtained from earlier researchers such as Symons

(2008), Dekleva (2005), and Wessels (2003) showed that managers fund their IT investment in an ad-hoc fashion. According to Symons (2008), several organizations were care less on using financial tools for analysis, but the responses from the interview revealed different results as shown in Table 6.

Table 6

Investment Tracking

Companies	Participants	Responses
Company A	Person A-CAPA	The management uses their resource management and CRM tool called Oracle CRM on Demand.
Company A	Person B-CAPB	Quarterly reviews/Annual reviews - Return on Investments, and productivity measurements.
Company A	Person D-CAPD	By using spreadsheets.
Company B	Person C-CBPC	They use applications such as ERP; Excel Spreadsheet, and CRM application software.
Company B	Person E-CBPE	Application software.
Company C	Person B-CCPB	Constant update to equipment costs and maintenance of surplus logs.

The data collected from company A reflected that tracking investments in IT infrastructure could be through application software like CRM, ERP, and ROI or by using Excel spread sheets as shown in Table 6. The differences as shown in Table 6 is that CAPB uses quarterly reviews/annual reviews, ROI, and productivity measurements; while CBPC uses applications such as ERP; Excel Spreadsheets, and CRM software. Similarities exist between company A and B in the use of CRM software to track investments in IT infrastructure. From the onset of this research study, I thought that

managers in these midsized companies would not have a process of tracking their investments in IT infrastructure. This is because Symons (2008) and Dekleva (2005) found that the benefits realized by investing in IT infrastructure are hard to describe. As a result, tools used to measure the future benefits in organization becomes more difficult. However, the data collected revealed that about 40% of the participants used tools to track their investment in IT infrastructure. Secondly, Symons (2008) also asserted that several organizations were less concerned about using the financial tools for analysis; rather, they funded infrastructural investment on faith without a business case. Based on the responses from the interview, managers appear to have a process to track their investment in IT infrastructure as stated above. For example, participants in these three midsize companies used CRM, ERP, Excel Spread Sheets, quarterly review/ annual review, and ROI. The responses obtained from the interview did not agree with the previous researcher's perceptions that *several organizations were less concerned about using tools for analysis*, but only 40% of managers appear to track their investments in IT infrastructure.

Analysis of Themes

Theme 1: The outcome of the result from the data collected reflected that the company A and B partially converged on ROI model being adequate to justify investments in IT infrastructure. This is because only 33.3% of the participants from the company A and B believed that ROI model is adequate to justify investment in IT infrastructure. From the researcher's view point, ROI appears to be appropriate when quantifying tangible benefits. The reason 33.3% of the participants used the ROI model

could be that the model helps to determine the benefit of an investment, by offsetting the cost of the investment project. However, company C had a different view in justifying investments in IT infrastructure. The interview data collected from company C revealed that the justification depends on the business model the organization have adapted. According to the statement in company C managers possibly believed that the process to justify investments in IT infrastructure should be dynamic. For example, (Lee & Bose, 2002) noted in that the highest profits of investments in IT appear to be realized by organizations when IT investment is joined with other independent investments, such as organizational restructuring, reengineering, and redesign.

Theme 2: the data collected in company B indicated that cost reduction was the reason for investments in IT infrastructure. Data collected from company A and C also revealed that cost was the reason to justify investments in IT infrastructure as well. However, did not emphasize that cost was the process used in the organization to justify investments in IT infrastructure.

Theme 3: This category have mixed perspective in justifying investments in IT infrastructure. The data collected revealed that managers appear to be flexible in justifying investments in IT infrastructure. For example, the data showed that these midsize companies used for the research study had different approaches to justify investments in IT infrastructure as shown in Table 5.

Theme 4: The interview data indicated that the company A had different approaches to track investments in IT infrastructure, which differs from company B. For example, company A uses software, and quarterly reviews to track their investments,

while company B uses software mainly. The data showed that both companies have similarities in the use of software application to track their investments. Overall, 40% of the participants tracked their investments in IT infrastructure.

Research Question 2

How do investments in IT infrastructure produce the desired results in your organization? This research question attempted to explore the benefits realized from investments in IT infrastructure. That is if the investments in IT infrastructure have produced the required benefits to these three midsize companies. Researchers such as: Wessels (2003), Dekleva (2005), and Symons (2008) perceived in this study that benefits of investments in IT infrastructure are difficult to quantify. However, the data collected from interview responses revealed some of the intangible benefits realized from IT investments.

Theme 5: Benefits.

This theme was found based on the responses from the interview. These interview questions were linked to the research question 2 on the benefits of investments in IT infrastructure. The idea was to explore factors that motivate these three midsized companies to invest in IT infrastructure. This is to see, if the investments in this area of technology have produced the required benefits needed for future growth or performance within the organization as displayed in Table 7.

Table 7

Benefits of IT investments

Companies	Participants	Responses to question 7-10
Company A	Person E-CAPE	High productivity, operational efficiency, and quality data management.
Company B	Person C-CBPC	Operational efficiency, high productivity ratios, and quality data management.
Company B	Person B-CBPB	Savings of time and money.
Company C	Person C-CCPC	Revenue generated by new initiatives.
Company C	Person B-CCPB	Reduced workload, and increase efficiency.
Company A	Person A-CAPA	Investment in IT infrastructure has increased data efficiency, and reduces the lead time to accomplish task in the organization.
Company B	Person D-CBPD	High production rate, and low employee turnover.
Company C	Person C-CCPC	Gained competitive advantage, efficiency, cost reduction, and high productivity.
Company A	Person D-CAPD	Investment in IT infrastructure created revenue to the organization, and increased Efficiency to work flow.
Company B	Person A-CBPA	Fewer employees have been needed. For example my company used Efficiency improvement tool to manage all production machinery, and this captures and stores in the database all problems on particular equipment.

This theme noted that investments in IT infrastructure produced the required benefits/results. The data collected in this research study noted 93.3% of the participants perceived that intangible benefits realized from IT were motivating factors to invest in IT infrastructure. These intangible benefits are: efficiency, fewer employees have been needed, gaining competitive advantage, work flow, high productivity, and saving of time, and money. On the other hand, quantifying these intangible benefits into monetary value

for cooperate accountability had been a problem. However, this will call for recommendation for future research study.

Analysis of Themes' Results on Benefits

The results of the themes reflected that managers are convinced that investments in IT infrastructure produced the required benefits in their organizations. The participants in the research study were very helpful to have participated in the process of a qualitative study. The data collected from the individual interviews of Company A and Company B indicated that managers had almost the same perspective based on the required benefits derived from investments in IT infrastructure, but differences were noted in the use of approaches (see Appendix C and D). For example, company A used a rigorous training program, end-user's feedbacks, and benefits against the cost in their approach, while company B used a business needs approach and periodic review of IT systems. When asked; what results has the organization derived from the investments in IT infrastructure? The data collected from CAPD in company A revealed that fewer employees have been needed, which could translate as a reduction in the work force as a result of investments in new technology. The reduction in labor force confirmed what was noted in Chapter 2. According to Kim et al. (2009), "A *worst case scenario* would seem to be that as a company invested more in IT infrastructure, negative human implications such as a reduction in labor force could occur" (p. 24). However, noted that managers in the same organization as shown on the individual interviews had divergent opinions on the justification of investments in IT infrastructure.

For example, the question in research question as; how investments in IT infrastructure produce the desired results in your organization? The data collected in CBPA showed that the company used efficiency improvement tools to manage all production machinery, and captured and stored all problems on equipment in the data base. The data collected from CBPB, and CAPC agreed that the result of the investment was that it saved time and money. This result confirms what has been noted in chapter 1 in the literature review. According to Accenture (2009) in a survey conducted in the United States; more than 550 executives indicated that cost savings and control are essential drivers in IT investment decisions.

Data Triangulation

As previously stated in chapter 3, the decision to use a case study to investigate how managers justify investments in IT infrastructure were to understand the processes of investments in IT infrastructure. Many researchers have conducted on the justification of IT investments, but there was no clear evidence to show how managers justify investments in IT infrastructure. Those who did as stated in the literature review used a quantitative approach. I used a focus group session to collect data to triangulate with data collected from the individual interviews. The results obtained in individual interviews were compared to the results obtained from the focus groups to ensure validity of the data. Based on the analysis of the individual interviews, about 33.3% of the participants agreed to use ROI as a formal process to justify investments in IT infrastructure. The results of the data collected from the participants partially agreed with what previously observed by Dekleva (2005) in the literature review. For

example, Dekleva (2005) noted that managers always used ROI to justify investments in IT infrastructure, but stated that not every calculation of ROI may be based on accounting calculations only. Then, argued that some intangible benefits exist that cannot be quantified easily. In the focus group session, when asked, "How do organizational leaders justify investments in IT infrastructure? The result obtained was slightly different from the one obtained from individual interviews (see Appendix B and C) respectively. According to the data collected from the focus group session, one of the participant's perceptions was that, it is difficult to quantify the benefits of investments in IT infrastructure. In addition, stated "investment in new technology by organizations was perceived to increased quality, efficiency and productivity in the short–to medium–term." The data collected noted that the investment in IT helps "to change business environment, to remain competitive and improved organizational performance." Alternatively, 33.3% of the participants in the individual interviews perceived that the cost approach was appropriate in justifying investments in IT infrastructure. In fact, only 6.6% of the focus group believed that cost approach was appropriate. In addition, noted that the justification could be by calculating the cost of maintaining the existing infrastructure than upgrades or building a completely net scalable infrastructure to meet better with technology (see Appendix B). The data from individual interviews and the focus group were combined. The result showed that approximately 40% of the participants believed that the cost approach was adequate to justify investments in IT infrastructure.

The use of the focus group session was helpful to explore how managers justify investments in IT infrastructure. For example, data collected from the focus group session noted "although, my organization has a process of justifying investments in IT, but the process was not clear enough as to ascertain that the investments had brought the required benefits to the organization." However, the statement adds value to the investigation of the study but was not documented. During the focus group session, I noted that some of the participant skipped some questions, and some of them agreed to the perspectives of other members. In all, participant's attitudes toward the questions were rated as satisfactory, and they were very excited to have participated in the qualitative research process. In chapter 5, there will be a discussion for the study and how it was conducted, the meaning of the findings, the implication of positive social change, and recommendation for action.

RQ1Summary: The data collected from the interviews indicated that 33.3% of the participants from company A and B partially agreed that managers justify investments in IT infrastructure by looking at ROI. In the other hand, about 66.6% of the participants used alternative approach to justify investments in IT infrastructure as shown on appendices B, C, and D respectively.

RQ2 Summary: The data collected indicated that intangible benefits derived from IT investments motivate managers to invest in IT infrastructure. Confidently, about 93.3% of the group perceived that intangible benefits realized from IT projects such as efficiency, high productivity, and saves time and money were essential drivers or motivating factors to justify investments in IT infrastructure.

Summary

The purpose of Chapter 4 is to report the research findings from an investigation of how managers justify investments in IT infrastructure. The questionnaire responses and analysis of documented evidence obtained from the investigation were presented in this chapter. In addition, the following elements covered in this chapter were (a) process of data collection as stated in chapter 3, (b) the interview questions that helped to gather the answers from the two central research questions, (c) the data analysis, and (d) data triangulation, which combined the interviews with the arm of the focus group for cross validation of data. It was noted that 33.3% of the participants in company A and B perceived that managers justify investments in IT infrastructure by looking at return on investments (ROI). In fact, about 93.3% of the participants saw a return on investments in IT infrastructure through benefits realized from the investment project. Previous researchers argued that, ROI model used to justify investments in IT infrastructure as a systematic process does not account for the intangible benefits. For this evaluation, the perceptions of the earlier researchers on this topic appear to be that investments in IT infrastructure could be difficult to quantify. Based on the responses from the interviews and the focus group session, managers justify investments in IT infrastructure because of intangible benefits realized from the investment. The quantification of these intangible benefits into monetary values appears to be an issue that calls for investigation for future research.

Conclusion

The interview data showed that managers justify investments in IT infrastructure based on intangible benefits realized from IT. These intangible benefits include efficiency, customer services, high productivity, and gaining competitive advantage, among others. According to the participants' responses, each of these benefits adds value to the organization.

Chapter 5: Discussion, Conclusions, and Recommendations

The reason for the exploration of how managers justify investments in IT infrastructure was that senior IT managers expressed concerns about insufficient benefits from IT investments. Understanding the value-added benefit of IT investments is critical for decision-making in any organization. However, there was limited research evidence in this regard. This exploration sought to understand how leaders of midsized businesses justify investments for information technology infrastructure. In addition, literature reviewed shown that few midsized businesses had a formal process in place to justify investments in information technology infrastructure. With the dynamic nature of business, justifying investments in IT infrastructure appears to be difficult. The study also explored whether or not investments in IT infrastructure have produced the required infrastructure for immediate benefits, such as acquiring knowledge that leads to organizational success. A qualitative case study approach was used for this exploration, and a combination of individual interviews, and a small focus group. A pilot study was conducted to ensure reliability of the instrument. Data was collected using electronic interviews and from a small focus group session. Collected data were coded and analyzed for themes or patterns.

There were 5 participants each for the organizations purposefully selected for the study. The participants of each organization were represented in the Appendices B, C, and D, respectively. The result of the analysis showed that 33.3% of the participants always look at ROI as formal process to justify and quantify investments in IT infrastructure. However, about 66.6% of the participants considered other approaches or

process to justify investments in IT infrastructure. The design method adapted in this study was a case study in which two companies A and B were used for individual interviews and C for the focus group. Findings noted 93.3% of the participants were motivated to invest in IT infrastructure because of intangible benefits. These intangible benefits include: efficiency, cost-benefit, revenue, saving of time, increase in production output and gaining competitive advantage. The detailed results were discussed in chapter 4.

Interpretation of Findings

The findings showed that managers justify investments in IT infrastructure based on intangible benefits realized from IT. Each of these interview questions produced five different views on how organizations justify investments in IT infrastructure as noted in chapter 4. Themes were formed based on the responses from the interviews. There were four different themes found from interview responses that linked to research question 1. According to the results obtained from the interviews, managers appear to be motivated to invest in IT infrastructure because of the intangible benefits. The first theme looked at ROI as the process used to justify investments in IT infrastructure. The data collected from company A and B partially agreed that ROI approach was appropriate as the process to justify investments in IT infrastructure. With referenced to the interview data collected from these midsize companies, only 33.3% of the participants agreed that ROI model was adequate for the justification. Alternatively, only 6.6% from company C agreed on the use of ROI model rather indicated a different approach to justify investments in IT infrastructure. In fact, the data collected from interviews in company C noted that

managers should be flexible in the use of models or approaches to justify investments in IT infrastructure. As indicated in Table 4, 40% of the participants revealed that cost model was adequate for use to justifying investment in IT infrastructure. The theme on mixed perspectives explored different approaches to justify investments in IT infrastructure. For example, the data collected from interview responses from company B indicated that results could be achieved by performing periodic review, and budget cycle. The researcher sees periodic review as a process of managing inventory for a certain period. It could be that the organization applies the method of inventory management system to determine the scalability of their IT infrastructure investments. However, the data did not reveal or explained in detail the period of evaluation of IT infrastructure within the organization. Detailed explanation for evaluation would have helped to ascertained when new investments in technology are needed in the organization. On the other hand, the data collected from company A noted that value can be created to the organization by performing life cycle program and upgrade technology design. From the researcher's view point, the system life cycle management gives the organization a scalable solution to manage their IT infrastructure to increase performance and profitability. The use of system life cycle and technology upgrade approach by company A could possibly indicated that the management cares much on gaining competitive advantage. If that is the case, the organization possibly invests in IT infrastructure because of the intangible benefits. This also reaffirms what has been noted above that 93.3% of the participants agreed to invest in IT infrastructure because of the intangible benefits realized from Investments in IT infrastructure. The theme on investments

tracking was found from interview responses as note earlier in this study. The result obtained showed that these midsize organizations that were studied use software application to track their investments in IT infrastructure.

For example, when asked; how does your organization quantify and justify investments in IT infrastructure? The responses were: the amount of money generated by the IT department, we set measurable outputs, quantifiable deliverables, which are measured throughout the system's life-time. In addition, by carefully understood and analyze budget, available technology, and capacity of staff, weighed against goals and mission, by benefit against cost. Amount of time and materials saved, ROI, and compared expenses to offset them with future revenues or savings were also noted to be important. Included were: improved SLAs, higher profit margin, improved customer satisfaction, and so on. Stated that IT saved time and money, to make profit, reduce lead time, and increase efficiency to the work process.

When compared the result of the individual interviews from the data collected from the focus group, I noted that about 93.3% of the participants agreed that investments in IT infrastructure produced the desired results. In addition, the data reflected that about 33.3% of the participants agreed on using ROI model to justify investments in IT infrastructure, whereas about 66.6% of the participants used alternative approach to justify investments in IT infrastructure as shown in Appendix B, C, and D respectively. From the result of the analysis, it appears that managers justified investments in IT infrastructure based on the required benefits realized from the investment. These benefits

could be translated into efficiency, competition, customer services, and cost savings to the organization.

The result of the focus group session shows that 6.6% of the participants had different view about how managers justify investments in IT infrastructure. As indicated in the data collected from company C, "the process of IT investments is not easy to understand, and there should not be any process identification, but depends on the business strategies of the organization." This statement agrees with Wessels (2003) as he asserted leaders of organizations adopted the same formal process in justifying investments in IT infrastructure, and tools used by accountants or managers to calculate cost and benefits are not well understood. In addition, it could be that the subject on how managers justify investment in IT infrastructure was not based on the process used to quantify investments in IT infrastructure, rather was based on the behavior of managers. It could also be as a result of organizational culture, or lack of organizational change.

Overall, the findings in this study partially agreed with what was noted in the literature review. First, Dekleva (2005) noted that managers always used ROI to justify investments in IT infrastructure, but stated that not every calculation of ROI may be based on accounting calculations only. This study partially agreed with the statement. Findings from this study also showed that 33.3% of the participants use ROI to justify investment in IT infrastructure. Secondly, 93.3% of the participants were motivated to invest in IT infrastructure because of the benefits realized from the investment. These benefits include: efficiency, competition, customer services, and saving money. Previous researchers such as Wessels (2003), Symons (2008), and Dekleva (2005) argued that the

use of ROI as a systematic process to justify investment in IT infrastructure does not account for these intangible benefits, and as such made the justification difficult to quantify. However, in this study, some of the responses were not relevant to the question. For example, in the Appendix C and D when asked; what are the processes in place used by your organization to justify investments in IT infrastructure? The response from the interview was a *strong* training program that generates income for the corporation, End-user feedbacks, reduced bottlenecks, and data redundancy. The researcher does not think that *strong* training program that generates income appears to be a process to justify investments in IT infrastructure. I cannot say that the tool used to collect the data was flawless, but I conducted a pilot study to validate the questionnaire, and the result of the pilot study showed that the questions were clear and easy to understand. Possibly, it could be that the participant was not truthful or did not want to reveal the processes used in their organization to justify investments in IT infrastructure or did not understand the question clearly. Based on the findings, managers justify investments in IT infrastructure not usually because of its monetary value as ROI per se, but for the benefits realized in the investments such as increased efficiency, competition, customer services, save time, and money. All of these however, lead to better ROI in different ways. This result partially explained why managers used the formal processes to justify investment in IT infrastructure that does not account for these intangible benefits as noted in the literature review.

The conceptual/theoretical framework on which this research was based as noted in chapter 1 focused on the goals managers set for themselves as stake- holders of the

organization. As reflected in chapter 1 also, Murphy et al. indicated that goal-based approach can be used to evaluate an organization by the goals that leaders set for the organization. However, organizational leaders have varied and sometimes contradictory goals, making cross firm comparisons difficult. Murphy et al. (1996) believed that organizations are of different forms, and based on the form, the organizational leaders could behave in certain ways causing researchers often to focus their study sample in a particular industry to control the differences regarding firm effectiveness and profitability. Based on the findings as noted above managers justify investment in IT infrastructure by the benefits realized from the investment. As noted by Murphy et al. (1996) on the goal-based approach the findings above possibly reflected on how managers justify investment in IT infrastructure. In addition, the result of the finding could be that organizational leaders have varied and sometimes contradictory goals, which reflected on how managers justify investments in IT infrastructure as shown in appendices B, C, and D respectively.

Summary

This research study is an investigation into how managers justify investments in IT infrastructure. I conducted this study because the literature review shown that most managers fund their investments in IT in an ad hoc fashion. In addition, managers used a formal process that does not account for the intangible benefits. However, I used a total of 15 participants for this research study. Comparing the findings of the individual interviews with the findings of the focus group, I noted that about 93.3% of the participants agreed that investments in IT infrastructure produced the desired results.

Further, during literature review I noted that senior IT managers expressed concerns about insufficient benefits from IT investments. Understanding the value-added benefit of IT investments is critical for decision-making in any organization. Based on the findings managers justify investments in IT infrastructure because of intangible benefits realized from IT. These intangible benefits include efficiency, customer services, high productivity, and gaining competitive advantage and so on. The recommendation offered below will be in line with organization performance theory in which the framework of this research was based upon as noted in chapter 1.

Conclusion

The interpretation of the research findings were based on the two research questions, RQ1 and RQ2, respectively. The result reflected that 33.3% of the participants in company A and B partially agreed that managers justify investments in IT infrastructure by looking at ROI. On the other hand, 66.6% of the participants emphasized on the use of alternative approach to justify investments in IT infrastructure as shown on Appendices B, C, and D respectively. It was noted also that investments in IT infrastructure was perceived by the benefits realized from the investment project. These benefits include: efficiency, high productivity, saves time, and money. The interview questions were used to gather the data, and were based on the theoretical frame-work for this study.

Implications for Positive Social Change

Implications for positive social change include helping organizations prioritize and determine the investment structure within their organizations. The application of this

research could also help organizations to increase revenue, which will improve organizational performance. Implications of positive social change also include increased productivity and revenue, improved efficiency, employee satisfaction as well as cost savings to the organizations. In addition, for businesses interested in a new method of planning, evaluation, and monitoring can also benefit from this study. Further, this research can be adopted at various levels of organizations, economic development planning, leadership programs, environmental development, and infrastructure investment projects.

Recommendation for Action

The findings are detailed in Chapter 4. The findings are not generalizable because the companies used were purposefully selected. Regardless, the result of the study is important. The first recommendation is to the organizational leadership where the research was conducted. The recommendation for managers would be to adopt a scalable approach that has the flexibility to be quantified. Additional studies should be conducted with other companies in other industries and in other cities to confirm, or not, this study finding. However; ROI may be use but in agreement with the internal rate of return (IRR). Second, a recommendation for academia for publication purposes where a new approach to justifying investments in IT infrastructure may be developed that may be useful to organizations elsewhere. Future inquiries may be needed to include a larger sample size as well as to include other public infrastructural advocates and decision makers. This approach may be included into an academic curriculum as well as in university sponsored seminars. In addition, this research can be adopted within various

levels of organizations, economic development planning, leadership programs, government projects, environmental development, and infrastructure investment projects.

Recommendation for Future Studies

This study used a single case study to investigate into how managers justify investments in IT infrastructure. However, the study was exploratory and can go beyond those recommendations for action as stated above. This research study was conducted by purposefully selected three companies that met the study criteria. Irrespective of the above recommendations, the study set a platform for future inquiry. This study exposed factors managers considered when justifying investments in IT infrastructure, which will help organizational stakeholders for decision making processes, if considering Investments on IT. In fact, research in this area may be needed. The need would be to consider how these intangible benefits derived from investments in IT infrastructure could be quantified into monetary values as noted above. The success of the future study of Investments in IT infrastructure may be an intentional inclusion of many companies susceptible to investments in IT. The focus group did not reveal alternative approach to justify investment in IT infrastructure, but had slightly different perspectives from the individual interviews. In addition, it could be that the subject on how managers justify investment in IT infrastructure was not based on the process used to quantify investments in IT infrastructure, rather was based on the behavior of managers. It could also be as a result of organizational culture, or lack of organizational change. While the focal point for the future study centers on quantifying intangible benefits of investments in IT

infrastructure, future studies should also look into other areas of IT infrastructural projects in general.

Researcher's Reflection

The single case study approach of this research provided an opportunity to have a first hand in the research process. The interviews were conducted through electronic questionnaires. The focus groups created an opportunity to meet participants face to face. The focus groups also were very helpful in the sense that it created room for data triangulation. Some of the biases were avoided by appointing one participant to take notes during the focus group session. In fact, I had not been involved in the focus groups before, and this was my first time to have experienced firsthand information, and facial jokes by the participants, which electronic interview alone could not have provided. Acquiring contact with managers in various companies and seminars, they appear not to take the approach of investments in IT infrastructure very seriously. In other words, I was surprise how much they knew about investments in IT infrastructure during the session. The good thing as noted in the implication for positive social change is; this research can be adopted at complicated initiative within levels of organizations, economic development planning, leadership programs, environmental development, and infrastructure investment projects.

Conclusion

In all, the investigation into how managers justify investments in IT infrastructure was conducted because Organization leaders are dependent on IT (information technology) for corporate productivity; however, senior IT managers have expressed

concerns about insufficient benefits from IT investments. Understanding the value-added benefit of IT investments is critical for decision-making in any organization. At the onset of this study, it appeared that most managers do not have a process to justify investment in IT infrastructure or may have a limited process. However, literature review shown that the process or model used such as ROI does not account, or quantify intangible benefits into monetary values. Several literatures stated that the method used by managers to justify investment in IT infrastructure is not well understood and makes it difficult to quantify. I used a single case study to explore how managers justify investments in IT infrastructure. In fact, discovered that manager often times look at the benefits side of the investments not necessarily looking at ROI in terms of monetary values. In this research, I have analyzed the results and gave recommendations for future studies. I conclude this research study with the perception that how managers justify investments in IT infrastructure was uncovered. Equipped with knowledge, I seek for a better understanding of the subject with mind of participating in future studies of this inquiry.

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Appendix A: Interview Questionnaire

Two central research questions, functionally decomposed into a set of 10 interview questions, will be used in this study. Interview Questions 1 to 6 are derived from Research Question 1 (RQ1), and Interview Questions 7 to 10 are derived from Research Question 2 (RQ2). These questions will be used for both personal interviews as well as the focus group.

RQ 1: How do organizational leaders justify investments in IT infrastructure?

1. What are the processes in place used by your organization to justify investments in IT infrastructure?
2. How does your organization quantify and justify investments in IT infrastructure?
3. Who (stakeholders, divisions, among others) makes the decisions to fund IT infrastructure in your organization?
4. What are the main IT infrastructure services in the organization?
5. How do you keep track of the IT investment in the organization?
6. What are the critical success factors for investing in IT infrastructure?

RQ 2**:** How do investments in IT infrastructure produce the desired results in your organization?

7. What results has the organization derived from the investments in IT infrastructure?
8. How have IT investments for infrastructure helped the organization in the last two years?

9. What contributions have IT infrastructure made in the organization in the last two years?
10. Why does the organization invest in IT infrastructure?

Pilot Study Questions

The following questions will be used, in addition to the interview questions, to validate the questionnaire.

(1) Are the instructions clear and easy to understand?

(2) If not, what should be changed?

(3) Are the questions clear and easy to understand?

(4) If not, what should be changed?

(5) Do the questions cover the topic?

If not, what questions should be asked? Should any be changed or deleted?

These clarifying questions are derived from the topic of critical thinking according to Paul and Elder (2001).

Appendix B: The Focus Group Session

S/N	Participants	Questions	Answer
	Mr. A	How do organizational leaders justify investments in IT infrastructure?	In response to changing business environment, to remain competitive, and improve organizational performance. It is difficult to quantify the benefits of investments in IT. However, investment in new technology by organizations is generally perceived to increased quality, efficiency and productivity in the short – to medium –term.
	Mr. B		To keep up with changes/upgrades to existing IT infrastructure.
	Mr. C		It depends on the business model the organizations adapted to justify investment in Information Technology
	Mr. A	What are the processes in place used by your organization to justify investments in IT infrastructure?	I believe parts of what they use are the ROI calculation and the integration of ITIL (Information Technology Infrastructure Library) but I am not positive on that.
	Mr. B		When upgrades to existing infrastructure is needed, the IT department makes upgrade vs. replacement decisions.
	Mr. C		The process of IT investments is not easy to understand - there should not be any process identification, but depends on the business strategies of the organization.

Mr. A	How does your organization quantify and justify investments in IT infrastructure?	Improved SLAs, higher profit margin, improved customer satisfaction, etc.
Mr. B		The cost of maintaining the existing infrastructure vs. upgrades or building a completely net scalable infrastructure better to meet up with technology.
Mr. C		This is very relative to Business Model.
Mr. A	Who (stakeholders, divisions, among others) makes the decisions to fund IT infrastructure in your organization?	Stakeholders
Mr. B		The management makes the ultimate decision after consulting with the heads of IT infrastructure and Budget department.
Mr. C		President, Chief Financial Officer, Chief Information Officer and Board of Directors.
Mr. A	What are the main IT infrastructure services in the organization?	Infrastructure Remote services, data storage support, Desktop, and end-user computing management, technical support, and networking services.
Mr. B		Equipment and network maintenance.
Mr. C		In today's contemporary Technology Outfit - Cloud: IaaS (Infrastructure as a Service), PaaS (Platform as a Service) Managed Services, etc

Mr. A	How do you keep track of the IT investment in the organization?	No response
Mr. B		Constant update to equipment costs and maintenance of surplus logs.
Mr. C		It depends on your Business Model. What services are you engaged in? service outsourcing, managed services, Education, Research, and Development etc.
Mr. A	What are the critical success factors for investing in IT infrastructure?	Increases productivity or labor replacing, improves efficiency in products and services.
Mr. B		Better equipment and organization to keep up with advances in technology.
Mr. C		Rate of Marginal Returns from investments in IT infrastructure.
Mr. A	How do investments in IT infrastructure produce the desired results in your organization?	Increased productivity or labor replacing, improved efficiency in products and services.
Mr. B		Investment in IT infrastructure has increased data efficiency, and reduces the lead time to accomplish task in the organization.
Mr. C		Reduced workload, and increase efficiency.
Mr. A	What results has the organization derived from the investments in IT infrastructure?	The investment in IT infrastructure has helped the organization to meet with their strategic objectives such as data integration. In addition, the use of cloud computing has made it easier to move your data

		anywhere, and reduce cost for data management within the organization.
Mr. B		Higher bandwidth for all users.
Mr. C		Investments on IT infrastructure created revenue to the organization, and increased efficiency to work flow.
Mr. A	How have IT investments for infrastructure helped the organization in the last two years?	No response
Mr. B		Better communication, less downtime because of obsolete equipment.
Mr. C		Easy collaboration to work peers, and data management.
Mr. A	What contributions have IT infrastructure made in the organization in the last two years?	Increase efficiency to the business processes.
Mr. B		It has improved the overall efficiency of the organization; less downtime, more bandwidth, better, and faster equipment.
Mr. C		Investments in IT infrastructure have redefined users' needs and a new approach to services and delivery, irrespective of the product - goods or services.
Mr. A	Why does the organization invest in IT infrastructure?	To increase productivity output.
Mr. B		To better serve the organization and to keep up with advances in IT infrastructure to communicate better with people outside the organization.

Mr. C	To stand with the competition, and reduce cost of production.

Appendix C: Individual interviews for Company A

S/N	Participants	Questions	Answers
	Mr. A	How do organizational leaders justify Investments in IT infrastructure?	They always look at their ROI (Return of Investment) and calculate their expenses and gains.
	Mr. B		Through return on investments, increased productivity, and simplified business processes.
	Mr. C		By showing that such investments add additional security, efficiency, or needed functionality to the Organization's IT structure.
	Mr. D		Our organization justify investment in IT infrastructure by the benefits realized for the investment, which is Speed, and efficiency.
	Mr. A	What are the processes in place used by your organization to justify Investments in IT infrastructure?	Strong training program that generates income for the corporation. A team of seasoned, dedicated, and highly skilled IT engineers and managers who work round the clock to make to realized the organization's objectives.
	Mr. B		End-user feedbacks, reduced bottlenecks/data redundancy, cost-benefit Analyses, easy access to data and enterprise systems.
	Mr. C		Life cycle program. Upgrades, technology design, marketing, and customer services.
	Mr. D		One process is by calculating return on Investment ROI, which is speed, and efficiency against cost for the investment.
	Mr. E		My organization use ROI model, efficiency, and high productivity ratio.
	Mr. A	How does your organizations quantify and justify investments in IT infrastructure?	The amount of money generated by the IT department. The IT is low maintenance and does not cause many problems for the entire organization.
	Mr. B		We set measurable outputs, quantifiable deliverables that are measured throughout the system's life-time.

Mr. C		By careful understanding and analyze budget, available technology, capacity of staff, weighed against goals, and mission.
Mr. D		They quantify and justify IT investment in infrastructure by Benefit against cost.
Mr. E		The organization use cost-benefit analysis.
Mr. A	Who (stakeholders, divisions, among others) makes the decisions to fund IT infrastructure in your organization?	Management makes much of the decision.
Mr. B		Usually user-driven, the Chief Information Officer sends a proposal with budget implications to the senior management. The senior management makes the final decision.
Mr. C		My organizational stakeholders, organizational leaders, and IT leaders.
Mr. D		Managers and the CFO.
Mr. E		The upper-level management and divisional managers. However, a divisional manager makes the recommendation.
Mr. A	What are the main IT infrastructure services in the organization?	Web Hosting, Vulnerability Assessment, Server Builds, Network Security Monitoring.
Mr. B		Transactional systems (SAP), Reporting systems (Oracles), Messaging systems (Lotus Notes), HR system (PeopleSoft), Monitoring, and Evaluation Systems such as Development Outcome Tracking systems (DOTS), social networking/collaboration systems Communication systems (Same time, and collaborate, Skype, etc), security/ID validation systems, etc.
Mr. C		Networking technical support, Technology infrastructure setup, and configuration.
Mr. D		Exchange server, and SQL.
Mr. E		Unified communications, networking, and data integration.

Mr. A	How do you keep track of the IT investment in the organization?	The management uses their resource management and CRM tool called Oracle CRM On Demand.
Mr. B		Quarterly reviews/Annual reviews - Return on Investments, and productivity measurements.
Mr. C		Oracle Business Suite.
Mr. D		By using spreadsheets.
Mr. E		Through budget reviews, IT infrastructural investment documentations, and ERP application.
Mr. A	What are the critical success factors for investing in IT infrastructure?	Strong leadership and managerial capability.
Mr. B		User-friendly, demand-driven. Low post-implementation maintenance costs.
Mr. C		Know your budget, know your goals, know your organizational needs, know your future.
Mr. D		Speed and efficiency
Mr. E		High productivity, efficiency, and profitability.
Mr. A	How do investments in IT infrastructure produce the desired results in your organization?	Matrices are used to measure the desired results. One of such matrices is Microsoft Dynamics CRM tool.
Mr. B		No response
Mr. C		By competent IT staff manipulating the technology the way it was meant to be used
Mr. D		Speed and efficiency
Mr. E		High productivity, operational efficiency, and quality data management.
Mr. A	What results has the organization derived from the investments in IT infrastructure?	High production rate, and low employee turnover.
Mr. B		Increased productivity through faster data access, better data security, and easier online collaborations by staff in various field.

Mr. C		Saving money, more production, and better working environment for staff and managers.
Mr. D		Fewer employees have been needed.
Mr. E		Increase in production output, and quality customer services support.
Mr. A	How have IT investments for infrastructure helped the organization in the last two years?	The IT department is the life line of my organization. Investments made in IT in the past three years in the area of upgrading the network backbone and other infrastructural developments have been paid off from the IT generated income.
Mr. B		Reduced data losses, faster file transfers and file sharing, faster transaction processing/inter-office communication.
Mr. C		Saving money by investing in technology that makes work more efficient. Saves time, and prepare for easier payroll etc.
Mr. D		Communication and efficiency have greatly increased.
Mr. E		Higher profit margin realized from the IT investment, and reinvested to other operational departments.
Mr. A	What contributions have IT infrastructure made in the organization in the last two years?	IT department is lending money to other departments - Marketing and Sales, Engineering, HR, and Legal.
Mr. B		Easier to monitor projects from HQ without frequent travels to the field thereby reducing travel costs.
Mr. C		Hands on work support, more efficient computers and software programs for staff to work on. Upgraded wireless and better working solutions for commuters.
Mr. D		Speed and efficiency.
Mr. E		Increased operational efficiency, and real-time customer support.

Mr. A	Why does the organization invest in IT infrastructure?	IT has ROI and can generate high income within short time. The training division of the IT department is a money making machine. IT department is the least funded department but is the cash cow and life line of the corporation.
Mr. B		To improve transactions, security, and business processes.
Mr. C		To keep an efficient technology structure in place. This allows efficient working environment, not only for staff, but also for customers as well.
Mr. D		To save time and money.
Mr. E		To make profit, reduce lead time, and increase efficiency to the work process.

Appendix D: Individual Interviews for Company B

S/N	Participants	Questions	Answer
	Mr. A	How do organizational leaders justify investments in IT infrastructure?	By measuring return on investment (ROE)
	Mr. B		By indentifying Business needs that required the support of IT in the current and future businesses.
	Mr. C		My organization use ROI model to justify investments in IT infrastructure.
	Mr. D		Return on investment model is often used to justify investments in IT infrastructure. Although there are other methods, which am not sure at this time.
	Mr. E		The organization use ROI.
	Mr. A	What are the processes in place used by your organization to justify investments in IT infrastructure?	Periodic reviews and infrastructural audits
	Mr. B		Budget cycle. Requests from internal users to perform their daily operations and future needs. All requests are entered in the system for IT Service and go through an approval process.
	Mr. C		They measure the return on investment and offset it with cost for the investment.
	Mr. D		The organization always considers cost in justifying investments in IT infrastructure.
	Mr. E		The organization considers the need for infrastructure investment, and look at the cost, and ROI of the IT project.

Mr. A	How does your organization quantify and justify investments in IT infrastructure?	By amount of time and materials saved.
Mr. B		Return of Investment. Compare expenses and offset them with future revenues or savings.
Mr. C		They perform cost-benefits analysis.
Mr. D		They look at cost to benefits and the need for the investment.
Mr. E		My organization looks at cost model to justify investments in IT infrastructure.
Mr. A	Who (stakeholders, divisions, among others) makes the decisions to fund IT infrastructure in your organization?	The Chief IT officer and departmental heads.
Mr. B		Various department head.
Mr. C		Both the stakeholder and the divisions share the responsibilities for such decision to fund IT investments in the organization.
Mr. D		The stakeholders.
Mr. E		The stakeholders.
Mr. A	What are the main IT infrastructure services in the organization?	Enterprise system software like SAP, computerized maintenance management systems and Kronos time management.
Mr. B		Desktops for users to perform daily operation. Back end servers to run back office application. Network and security infrastructure to link all the applications.
Mr. C		Communications, technical support, and networking.
Mr. D		IT communication support, and help desk in infrastructure.

Mr. E		Communication support and networking.
Mr. A	How do you keep track of the IT investment in the organization?	By daily use and applications.
Mr. B		Budget cycle. They have system in place to keep track on expenditure against budgeted amounts.
Mr. C		They use applications such as ERP; Excel spread sheet, and CRM application software.
Mr. D		Excel spread sheet, and application software.
Mr. E		Application software.
Mr. A	What are the critical success factors for investing in IT infrastructure?	Effective time management, reduction of material wastage, ease of people, and resource management.
Mr. B		Savings of time and money. Revenue generated by new initiatives.
Mr. C		Work efficiency, cost reduction in labor force, and high profitability.
Mr. D		Efficiency, cost reduction, and high production.
Mr. E		High production and efficiency.
Mr. A	How do investments in IT infrastructure produce the desired results in your organization?	For example my company used Efficiency improvement tool to manage all production machinery, and this captures and stores in the database all problems on particular equipment.
Mr. B		Savings of time and money. Revenue generated by new initiatives
Mr. C		Operational efficiency, high productivity ratios, and quality data management.
Mr. D		Efficiency, cost reduction, and high production.

Mr. E		Increase in efficiency for work, competitive advantage, and high production output.
Mr. A	What results has the organization derived from the investments in IT infrastructure?	Efficient work group and time use.
Mr. B		Savings of time and money. Revenue generated by new initiatives.
Mr. C		Has gained competitive advantage from sales force, efficiency, and high productivity ratios.
Mr. D		Gained competitive advantage, efficiency, cost reduction, and high production.
Mr. E		Cost reduction, efficiency, and high production.
Mr. A	How have IT investments for infrastructure helped the organization in the last two years?	Improved ROE while mitigating losses.
Mr. B		Savings of time and money. Revenue generated by new initiatives
Mr. C		Through the benefits realized from the investments such as competitive advantage from sales force, efficiency, and high productivity ratios.
Mr. D		With the help of IT, teams at different locations are able to collaborate with the integrated application systems (ERP).
Mr. E		Cost reduction, efficiency, and high production.
Mr. A	What contributions have IT infrastructure made in the organization	Ease of information flow and quick decision-making in the organization.

	in the last two years?	
Mr. B		To save Time and money and revenue generated by new initiatives.
Mr. C		Has gained competitive advantage from sales force, efficiency, reduced labor force, and high productivity ratios.
Mr. D		Team and sales force collaborations, and increase in efficiency of work process.
Mr. E		Fast communication among team with our integrated system, low production cost, and competitive advantage.
Mr. A	Why does the organization invest in IT infrastructure?	To gain more strategic advantage over competitors.
Mr. B		To save Time and money and revenue generated by new initiatives.
Mr. C		Increase efficiency, gain competitive advantage, and high productivity.
Mr. D		High productivity, cost saving and competitive advantage.
Mr. E		Cost reduction, efficiency, and high production.

Appendix E: Letter of Cooperation from a Community Research Partner

Company A

Date: 10/11/11

Dear Richmond Ibe,

Based on my review of your research proposal, I give permission for you to conduct the study entitled *An investigation into how managers justify investments in IT infrastructure* within the organization. As part of this study, I authorize you to interview managers, and disseminate the findings in summary form to participants. Individuals' participation will be voluntary and at their own discretion.

We understand that our organization's responsibilities include making the necessary resources available to the student researcher. We reserve the right to withdraw from the study at any time if our circumstances change.

I confirm that I am authorized to approve research in this setting.

I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the research team without permission from the Walden University IRB.

Sincerely,

Authorized Signature_____

Contact_____

Walden University policy on electronic signatures: An electronic signature is just as valid as a written signature as long as both parties have agreed to conduct the transaction electronically. Electronic signatures are regulated by the Uniform Electronic Transactions Act. Electronic signatures are only valid when the signer is either (a) the sender of the email, or (b) copied on the email containing the signed document. Legally an "electronic signature" can be the person's typed name, their email address, or any other identifying marker. Walden University staff verifies any electronic signatures that do not originate from a password-protected source (i.e., an email address officially on file with Walden).

Appendix F: Invitation Letter Requesting Participation

11/27/2011

Dear Roberto,

I am a doctoral candidate at Walden University in the Ph.D. in Management Program. The purpose of this letter is to invite your staff to participate in a research study at Walden University on *An investigation into how managers justify investments in IT infrastructure*. The outcome of this study may be useful to your organization because there has not been an acceptable model on how managers justify investments in IT infrastructure according to research.

I would like to conduct online interviews with you and several other participants in your organization. For example, engineers and managers in your organization to collect information on this topic, which will be held in confidence and analyzed in this research, study. An executive summary of the research study will be provided to all participants at the end of this study by electronic mail. The interview will take approximately 20 to 30 minutes.
I will contact you by email during the next day or so to confirm your interest. Please contact me at richmond.ibe@waldenu.edu or call me, if you have any questions.

Thank you,

Richmond Ibe
Doctoral Candidate Walden University
Ph.D. in Management
richmond.ibe@waldenu.edu

Appendix G: Invitation Letter Requesting Participation

11/27/2011

Dear Kingsley,

I am a doctoral candidate at Walden University in the Ph.D. in Management Program. The purpose of this letter is to invite your staff to participate in a research study at Walden University on *An investigation into how managers justify investments in IT infrastructure*. The outcome of this study may be useful to your organization because there has not been an acceptable model on how managers justify investments in IT infrastructure according to research.

I would like to conduct focus group discussions with you, and several other participants in your organization. For example, engineers and managers in your organization to collect information on this topic, which will be held in confidence and analyzed in this research, study. An executive summary of the research study will be provided to all participants at the end of this study by electronic mail. The focus group discussion will take approximately 20 to 30 minutes. The focus group session will be conducted at your Dallas office location on 11/2011 at 3.30 pm central time.

I will contact you by email during the next day or so to confirm your interest. Please contact me at richmond.ibe@waldenu.edu or call me, if you have any questions.

Thank you,

Richmond Ibe
Doctoral Candidate Walden University
Ph.D. in Management
richmond.ibe@waldenu.edu

Appendix H: Informed Consent

INFORMED CONSENT FORM

You are invited to take part in a research study of *An investigation into how managers justify investments in IT Infrastructure.* You were chosen to participate in the study because your organization appears to have significant IT investment and has made some technology changes over time. This form is part of a process called "Informed Consent" to allow you to understand the proposed study before deciding whether to participate.

This study is being conducted by Richmond Ibe, who is a doctoral learner at Walden University. The focus of the doctorate study is in the area of management, with a specialization in information systems management.

Background Information:
The purpose of the study is to understand how leaders of midsize businesses justify information technology investments for infrastructure. In addition, the goal is to explore how company leaders justify IT investment as a part of a corporate infrastructure.

Procedures:
If you agree to participate in this study, you will be asked to:

- Consent for electronic interview about 20 minutes.

Voluntary Nature of the Study:
Your participation in this study is voluntary. This means that your decision to participate or not participate in the study will be respected. You will not be treated differently if you decide not to participate in the study. If you decide to participate in the study, you can withdraw at any time during the study. If you feel stressed during the study you may stop at any time. Additionally, you may skip any questions that create discomfort or are too personal for you.

Risks and Benefits of Being in the Study:
This study does not involve more than the minimal risk of harms that go beyond the normal daily experiences in life. Data collected during Interviews with study participants such as participant names and responses will be treated as confidential. Focus group data collected will also be treated as confidential. In addition, focus group participants need not respond to questions that may considered by the participant to be embarrassing or harmful to others. The expected benefit of participation will be the experience to participate in a qualitative research study and to obtain a copy of the study findings.

Compensation:
Each participant will receive a copy of an executive summary of the research findings, and a $5.00 Starbucks™ gift card in appreciation for your participation.

Confidentiality:
All information provided will remain confidential. The researcher (Richmond Ibe) will not use your information for any purposes outside of the scope of the research project. Also, the researcher will not include your name or any other identifier that could link you to any reports or information from the study.

Contacts and Questions:
You may ask any questions you have now. If you have questions later, you may contact the researcher at richmond.ibe@waldenu.edu. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 1-800-925-3368, extension 1210. Walden University's approval number for the study is **IRB will enter approval number here** and it expires on **IRB will enter expiration date.**

The researcher will give you a copy of this form to keep.

Statement of Consent:

I have read the above information and I feel I understand the study well enough to make a decision about my participation. By signing below, I am agreeing to the terms described above.

Printed Name of Participant _____

Date of consent _____

Participant's Written or Electronic* Signature _____

Researcher's Written or Electronic* Signature Richmond .I. Ibe

Electronic signatures are regulated by the Uniform Electronic Transactions Act. Legally, an "electronic signature" can be the person's typed name, their email address, or any other identifying marker. An electronic signature is just as valid as a written signature as long as both parties have agreed to conduct the transaction electronically.

Appendix I: Informed Consent for the Focus Group

INFORMED CONSENT FORM

You are invited to take part in a research study of *An investigation into how managers justify investments in IT Infrastructure.* You were chosen to participate in the study because your organization appears to have significant IT investment and has made some technology changes over time. This form is part of a process called "Informed Consent" to allow you to understand the proposed study before deciding whether to participate.

This study is being conducted by Richmond Ibe, who is a doctoral learner at Walden University. The focus of the doctorate study is in the area of management, with a specialization in information systems management.

Background Information:
The purpose of the study is to understand how leaders of midsize businesses justify information technology investments for infrastructure. In addition, the goal is to explore how company leaders justify IT investment as a part of a corporate infrastructure.

Procedures:
If you agree to participate in this study, you will be asked to:

- Consent for 20 to 30 minutes focus group discussion.

Voluntary Nature of the Study:
Your participation in this study is voluntary. This means that your decision to participate or not participate in the study will be respected. You will not be treated differently if you decide not to participate in the study. If you decide to participate in the study, you can withdraw at any time during the study. If you feel stressed during the study you may stop at any time. Additionally, you may skip any questions that create discomfort or are too personal for you.

Risks and Benefits of Being in the Study:
This study does not involve more than the minimal risk of harms that go beyond the normal daily experiences in life. Data collected during Interviews with study participants such as participant names and responses will be treated as confidential. Focus group data collected will also be treated as confidential. In addition, focus group participants need not respond to questions that may considered by the participant to be embarrassing or harmful to others. The expected benefit of participation will be the experience to participate in a qualitative research study and to obtain a copy of the study findings.

Compensation:
Each participant will receive a copy of an executive summary of the research findings, and a $5.00 Starbucks™ gift card in appreciation for your participation.

Confidentiality:
All information provided will remain confidential. The researcher (Richmond Ibe) will not use your information for any purposes outside of the scope of the research project. Also, the researcher will not include your name or any other identifier that could link you to any reports or information from the study.

Contacts and Questions:
You may ask any questions you have now. If you have questions later, you may contact the researcher at richmond.ibe@waldenu.edu. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 1-800-925-3368, extension 1210. Walden University's approval number for the study is **IRB will enter approval number here** and it expires on **IRB will enter expiration date.**

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Participant's Written or Electronic* Signature _____

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Curriculum Vitae

Richmond Ikechukwu Ibe

PROFESIONAL SUMMARY:

Experienced IT manager with excellent and project management skills. Action oriented professional with strong ability to communicate effectively with technology business executives in different organizational environment.

PROFESIONAL GOAL: To make meaningful contributions to the society through research.

EDUCATION:

School: Walden University
Major: PhD Management
Specialization: (ABD) Information Systems Management
Year: 2012

School: University of Phoenix (Phoenix Arizona)
Major: Business Administration (MBA)
Specialization: Project management
Year: 2006

School: Federal Polytechnic Nekede Owerri (Nigeria)
Major: B.S Architecture
Year: 1997

School: Career Development Institute
Major: Professional PC repairs
Certificate: A+
Year: 2005

CORE QUALIFICATION

- Demonstrate the ability to interact effectively with senior management
- Broad research and consulting background on information systems management
- Strong verbal communication, Issue resolution, and Quick learner
- Ability to use Microsoft tools such as office project, Visio basic, Excel, word, access, research analysis Nvivo software.

PROFESIONAL EXPERIENCE

University of Phoenix (Alumni Mentorship) Volunteer- (2010-Present)

- Taught students business statistics, organizational management, and its application to the business environment.
- Taught students how to develop marketing research analysis within business environment.
- Develop an information system model by creating business scenarios to add to the understanding of lecture topic.
- Helped students understand topics by one-on-one consultation on a special case.

Ryke Development Consult (2009 – Present)
Instructor

- Developed research project that helped students acquainted with synthesize, analyze and interpret information using appropriate disciplinary content and methodology.
- Taught students how to search the scholarly reviewed literature as part of research process, and assisted them in evaluating resource's appropriateness for research project.
- Set clear goals for the research assignment, and made the students understand what the assignment is meant to accomplish, what skills they expect to learn in the research process, and how it relates to scholarly practice in the discipline.

TELEPLAN/GATEWAY (2006-2009)

Irving, TX

IT project manager

- Conduct analysis to address project issues which led to completion of IT project within a time frame.
- Planned and executed the IT project by using the project management tools.
- Researched and updated all required materials needed for project initiation.
- Effectively controlled the release of proprietary and confidential organizational information regarding to the IT projects.
- Performed initial client assessment and analysis to begin research process for project execution.
- Develop progress report on a daily basis to align the organizational strategy with project objectives.

SERVICES ELECTRONICS (2003-2006) Dallas, TX

IT Lead/Quality assurance

- Provide on-site training for the employees on IT projects.
- Developed new process for employee evaluation which resulted in market performance improvements that realized revenue to services electronics.
- Review and provide comments on the adequacy of IT products and took necessary steps to cure any deficiencies.
- Supervised the Building of PC and electronics component's project within the organization.

PROFESIONAL AFFILLIATION/LICENSES

- Project management Institute (PMI Member)
- American Black MBA'S
- University of Phoenix Alumni
- Information Systems Auditors and Control Association (ISACA)
- Group 1 insurance license issued by TDI(Texas Department of Insurance)

HOBIES: Reading, soccer, listening to music, and playing games.

REFERENCES: Available upon request.

SEMINARS/CONFERENCES

ISACA seminar on risk management in Dallas, Texas, 2011
ISACA seminar on "Managing Cyber Threats - Risk Management and Insurance Solutions". Richardson, Texas, 75082
ISACA conference on the 7th Annual UTD Fraud Summit held on March, 2011 29th and 30th. UTD, IIA Dallas, ACFE Dallas and ISACA North Texas chapter.
PMI seminar on Team management 2010, Dallas, Texas chapter