Analysis of IT Related Financial Issues in Seven Companies of Sweden: Reasons Behind the Current Condition

Soumitra Chowdhury
Date: 2010-06-18
Subject: Information Systems
Level: Advanced
Course code: IV9024
Abstract
One of the best ways to get expected results from information technology (IT) in a business organization is to have a close look at the financial issues related to it. Financial issues such as IT investment, IT costs, IT resources should be dealt with special care if any organization wants to get best result from its IT systems. The purpose of this research is to investigate the condition of IT financial issues such as IT investment, IT costs, IT resources, IT business value etc. in the selected seven organizations of Sweden and to have an understanding behind the condition. First of all, a survey has been conducted with nine IT managers from these seven organizations to get an overview of the condition of dealing with various IT financial issues. Then follow-up interviews have been conducted with four of those IT managers that took part in the survey to find out the reason behind the condition dealing with those IT financial issues. The results of the study show that most the seven companies do not have proper capital budgeting technique, benefit identification plan for IT investment. Most of them do not calculate all the IT related costs. Most of them have lack of knowledge about the business value of IT. Their knowledge of impact of IT resources is not clear. The study further shows why those seven companies are having that kind of condition regarding the IT related financial issues.

Key Words: IT investment, IT resource, IT costs, IT financial issues
Acknowledgement

I would like to thank my supervisor Mr. Tobias Andersson Gidlund who guided me throughout my thesis work. He showed me almost each and every step while writing my thesis. I would also like to thank Mr. Jan Aidemark to inspire me to write a good thesis.

Special thanks to my parents who provided me mental support. The motivational conversation with them over telephone really gave me confidence while writing my thesis.

Special thanks to Capgemini Staff Senadin Alisic to help me in the data collection process from different companies.

Finally, lot of thanks to God to keep me fit and fine in the last six months. Any kind of illness would have postponed the writing process. Thanks to God again to keep me focused on my thesis work.
# Table of Contents

1. Introduction .................................................................................................1
   1.1 Problem Description ..............................................................................1
   1.2 Aims and Objectives ............................................................................1
   1.3 Research Questions ..............................................................................2
   1.4 Justification ..........................................................................................2
   1.5 Scope and Limitations ..........................................................................3
   1.6 Disposition ............................................................................................3

2. Literature Review ............................................................................................4
   2.1 Capital Budgeting Technique for IT investment .................................4
      2.1.1 Payback Period .............................................................................4
      2.1.2 Accounting Rate of Return on Investment (ROI) .........................4
      2.1.3 Discounted Cash Flow ....................................................................4
      2.1.4 Net Present Value ..........................................................................4
      2.1.5 Cost-Benefit Ratio .........................................................................4
      2.1.6 Internal Rate of Return ...................................................................4
   2.2 The Costs of Information Systems ......................................................5
      2.2.1 Costs of Purchase ..........................................................................5
      2.2.2 Costs of Implementation, ownership and change .......................5
   2.3 Information Technology and the Resource Based View ..........6
      2.3.1 Physical IT infrastructure ..............................................................6
      2.3.2 Human IT Resources ......................................................................7
      2.3.3 IT-enabled Intangibles .....................................................................7
   2.4 Business Value of IT ............................................................................8
      2.4.1 Impact of IT on the firm’s performance ......................................8
      2.4.1.1 Transforming the Firm ...............................................................8
      2.4.1.2 Changing Interactions with suppliers .......................................8
      2.4.1.3 Changing customer Relationships ..........................................9
      2.4.1.4 Impact on Productivity .............................................................9
   2.5 IT Infrastructure Investments Justification ......................................10
      2.5.1 Application-specific Investment ..................................................10
      2.5.2 To reduce costs of running and supporting existing applications 10
      2.5.3 To enable growth in the volume of business transactions .........10
      2.5.4 To bring changes in working practices ....................................10
      2.5.5 To create a new business capability ...........................................11
   2.6 Assessment of IT Investments based on application portfolio ....11
      2.6.1 Support Application ......................................................................12
      2.6.2 Key Operational System ...............................................................12
      2.6.3 Strategic Applications ..................................................................13
      2.6.4 High Potential Applications ........................................................13
   2.7 IT tools for real time Business Integration for better operations visibility 14
      2.7.1 Elements of Business Integration Platform ................................14
      2.7.2 Benefits of Business Integration tools .......................................14
   2.8 Benefit Management of IT Investment .........................................15
      2.8.1 Benefit Management Process .....................................................16
   2.10 Connection between the Theories and Research Objective ....19

3. Research Methodology ..................................................................................20
   3.1 Research Approach .............................................................................20
   3.2 Research Strategy ..................................................................................20
      3.2.1 Mixed method Strategy ...............................................................20
3.3 Data Collection ......................................................................................................................... 20
  3.3.1 Companies Selected for Data collection ................................................................................. 21
3.4 Survey Strategy ......................................................................................................................... 22
3.5 Structured Interviews ............................................................................................................... 22
3.6 Validity and Reliability ............................................................................................................. 22
3.6 Data Analysis Method .............................................................................................................. 23
  3.6.1 Survey Analysis Method ........................................................................................................ 23
  3.6.2 Interview Analysis Method ................................................................................................... 23
3.7 Ethical Consideration ................................................................................................................. 23
4. Analysis ...................................................................................................................................... 24
  4.1 Survey Analysis ....................................................................................................................... 24
    4.1.1 Responses on use of Capital Budgeting technique for IT investment ......................... 24
      4.1.1.1 Significance of the Analysis ......................................................................................... 25
    4.1.2 Responses on cost of IS/IT ............................................................................................... 25
      4.1.2.1 Significance of the Analysis ....................................................................................... 27
    4.1.3 Responses about the knowledge about Impact of IT resources ..................................... 27
      4.1.3.1 Significance of the Analysis ....................................................................................... 28
    4.1.4 Responses about knowing the Business value of IT ....................................................... 29
      4.1.4.1 Significance of the analysis ....................................................................................... 30
    4.1.5 Responses on justification of IT infrastructure investment ............................................. 32
      4.1.5.1 Significance of the analysis ....................................................................................... 33
    4.1.6 Responses on Application Portfolio .................................................................................. 34
      4.1.6.1 Significance of the Analysis ....................................................................................... 34
    4.1.7 Responses on use of IT tools for operational visibility ................................................... 34
      4.1.7.1 Significance of the Analysis ....................................................................................... 35
    4.1.8 Responses on Benefit Identification ............................................................................... 35
      4.1.8.1 Significance of the analysis about Benefit Identification ....................................... 36
    4.1.9 Responses on evaluation and reviewing of the implemented new IT system ................ 36
      4.1.9.1 Significance of the Analysis ....................................................................................... 37
    4.1.10 Responses on Challenges in Benefit Identification of IT investment ............................ 38
  4.2 Analysis of Interviews: Finding out the reasons behind the current condition in IT financial issues .................................................................................................................................. 39
    4.2.1 Interview responses on use of Capital Budgeting Technique ........................................ 39
    4.2.2 Interview responses on IS costs ......................................................................................... 40
    4.2.3 Interview responses on IT resources ............................................................................... 40
    4.2.4 Interview responses on Business value of IT ................................................................... 41
    4.2.5 Interview responses on IT infrastructure investment Justification ................................. 42
    4.2.6 Interview responses about the application portfolio ....................................................... 43
    4.2.7 Interview responses on use of IT tools ............................................................................ 43
    4.2.8 Interview responses on Benefit management of IT investment ..................................... 44
5. Discussion .................................................................................................................................. 45
6. Conclusion ................................................................................................................................. 52
  6.1 Validity & Reliability of the Results ....................................................................................... 52
  6.2 Contributions to the Field of Information Systems ............................................................... 53
  6.3. Future Research .................................................................................................................. 53
7. References .................................................................................................................................. 54
8. Appendix .................................................................................................................................... 56
LIST OF FIGURES

FIGURE 1: INVESTMENT ASSESSMENT BASED ON APPLICATION PORTFOLIO (WARD AND PEPPARD, 2002) .......... 12
FIGURE 2: PROCESS MODEL OF BENEFIT MANAGEMENT (WARD AND PEPPARD, 2002) .......................... 16
FIGURE 3: RESPONSES ON USE OF CAPITAL BUDGETING TECHNIQUE FOR IT INVESTMENT .............. 25
FIGURE 4: SURVEY RESPONSES ON CALCULATION OF ANNUAL MAINTENANCE COST AND IMPLEMENTATION & OWNERSHIP COST ........................................................................ 26
FIGURE 5: RESPONSES ON CALCULATING LABOR COST, VARIABLE COST AND INDIRECT COST .......... 26
FIGURE 6: RESPONSES ABOUT THE KNOWLEDGE OF IMPACT OF IT RESOURCES .............................. 28
FIGURE 7: RESPONSES ABOUT KNOWING THE BUSINESS VALUE OF IT .............................................. 30
FIGURE 8: RESPONSES ON IT INFRASTRUCTURE INVESTMENT JUSTIFICATION .......................... 33
FIGURE 9: RESPONSES ON APPLICATION PORTFOLIO ........................................................................ 34
FIGURE 10: RESPONSES ON THE USE OF IT TOOLS ......................................................................... 35
FIGURE 11: SURVEY RESPONSES ON BENEFIT IDENTIFICATION OF IT INVESTMENT ................ 35
FIGURE 12: RESPONSES OVER BENEFIT TRACKING AFTER IT IMPLEMENTATION ............................. 37
FIGURE 13: RESPONSES ON CHALLENGES OF BENEFIT IDENTIFICATION ...................................... 38

LIST OF TABLES

TABLE 1: CONNECTION BETWEEN THEORIES AND RESEARCH OBJECTIVES .................................... 19
TABLE 2: SURVEY RESPONSE FOR EACH IT MANAGER ABOUT KNOWING THE BUSINESS VALUE OF IT ............. 29
TABLE 3: SUMMARY OF EFFECTS OF KNOWING/NOT KNOWING IT BUSINESS VALUES .................. 32
TABLE 4: EFFECTS OF FOLLOWING AND NOT FOLLOWING THE REASONS OF IT INFRASTRUCTURE INVESTMENT .... 33
TABLE 5: EFFECTS OF IDENTIFYING EVERY BENEFIT OF IT INVESTMENT ........................................... 36
TABLE 6: EFFECTS OF REVIEWING OR NOT REVIEWING THE IMPLEMENTED IT SYSTEM ...................... 37
1. Introduction

1.1 Problem Description

There are various financial issues related to the proper utilization of Information Technology in the business organizations. These financial issues related to IT are tackled in different ways in different organizations. According to Boddy et al (2005), many organizations have had problems in predicting and controlling the costs and benefits of the IT services. For this reason, to have a look at what some selected organizations in Sweden do while calculating their IT costs will give a good idea to map with the above comments by Boddy et al (2005). Laudon and Laudon (1996) discuss different capital budgeting technique for IT investment. To understand when the investment on IT will return back, it is important to employ a capital budgeting technique for IT investment. So, to make an enquiry in some selected organizations in Sweden about the use of Capital budgeting technique for IT investment will be useful to see what degree of importance they give to the budgeting for IT.

The relationship between IT resource and firm performance has been discussed by many researchers (Bharadwaj, 2000). Some researchers mention that IT does not really provide advantage to the business (Bharadwaj, 2000). Is it the same case with the selected companies for this research? Do they know about the impact of IT resources in their business? How much do they give importance to the IT resources? Ward and Peppard (2002) discusses about five reasons of IT infrastructure investment and according to them any infrastructure investment should be assessed against all of these five criteria. It is important to know how the selected companies that participated in this research justify their IT infrastructure investment.

Investing on IT requires pre-investment appraisal, i.e., which IT systems require more investment as they may be vital for business success or which IT systems require less investment as they may be not vital for business. Farbey et al (1992) and Ward and Peppard (2002) both mentioned about the lack of pre-investment appraisal for most of the IT projects.

The current study is about looking at the conditions of various financial issues related to Information Technology such as IT related costs, Capital budgeting technique used for IT investment, Benefit management of IT investment, IT resources, IT business value etc. in some selected organizations in Sweden. Further to find out the reasons behind the existing condition in those issues is also a target of this study.

The current study has connection with the information systems development. As Avison and Shah (1997) describe, IT investment decision making and IT related various cost calculations are important tasks of feasibility study stage of information systems development. Feasibility study is the very first stage of information systems development. So, from that point of view we can say that the current research looks into the condition of information systems development’s feasibility study stage of the seven participating companies.

1.2 Aims and Objectives

The main objective of this study is to examine the current condition in various IT financial issues in the selected seven organizations in Sweden with the help of the existing literature that discussed different financial aspects of IT. This will help to understand what is happening in those Swedish organizations regarding those IT financial issues. For that purpose, a survey will be conducted on the seven organizations in Sweden. The participants of the survey will be those staffs who are working in the area of IT management in those organizations.

Another objective of this research is to look at the reasons behind the current conditions in those various IT financial issues. To get into this, some of the respondents for the survey will
be selected for the follow-up interviews. They will be asked to explain their responses on different survey questions on various financial issues related to IT.

It will be interesting for the reader of this paper to know what is the current condition in some of the IT financial issues in the selected organizations in Sweden and what are the reasons behind that.

1.3 Research Questions

1) What are the current conditions regarding various IT financial issues such as IT costs, IT investment, IT resource, IT business value in the selected seven organizations in Sweden?
2) What are the reasons behind the conditions in the above mentioned issues?

1.4 Justification

Milis and Mercken (2004) state that the records of measuring and controlling IT investments are not impressive. Boddy et al (2005) mention that over 50% of systems projects fail to meet their expected rate of return due to fundamental flaws in predicting initial cost. Hochstrasser and Griffiths (cited in Milis & Mercken, 2004) found that only 18% of the organizations in their sample rely on rigorous methods to calculate the benefits of investment in IT. Costs are significantly underestimated. Hochstrasser (1990) also found that some companies are unaware of the true costs involved in deploying IT. As a consequence the IT investment is not known and cannot be evaluated. Milis et al (2009) mention that most companies are following an ad hoc, unstructured, and unpredictable investment processes. Farbey et al (1992) found that only 50% of IS/IT projects went through the formal estimation before the investment. In less than half of the cases a recognized financial analysis technique was used, and in barely 30% was the outcome of the investment evaluated. Cooke and Parrish (cited in Ward and Peppard, 2002, p. 422) discovered that 70% of organizations had no formal justification and post-implementation review process for IS/IT investments. Farbey et al (1992) also suggest that given the wide variety of types of IS/IT investment and the wide range of benefit types, which can be quantified to greater or lesser degrees, a multiplicity of methods for justifying investments is needed. But, selecting the right approach in any situation can itself be loaded with organizational and political problems (Farbey et al, 1992).

After reading the above mentioned incidents, it will be very much logical to investigate the condition of IT financial issues such as IT investment, IT costs, IT resources, IT business value, benefit management of IT investment, IT tools for operational visibility etc. in the organizations in Sweden. So, seven Swedish companies have been selected to investigate their condition in the above mentioned IT financial issues. The current study will be very much helpful to find out what the selected Swedish organizations are doing to manage their IT investment or what they are doing for benefit identification before and after IT investment.

It will be also be important to find out the reasons behind the condition in various IT financial issues. Various points will come out from the investigation.

The findings of the current research will firstly be helpful to do a mapping between the different companies that are mentioned above and the participating companies of the current research. Mapping in a sense that the current research will look at the state of participating Swedish companies’ IT investment issues and it will be helpful to test whether the participant companies are dealing with the above mentioned IT investment issues in the same way like the other companies that are discussed by different authors.

Moreover, the second part of the research which will look for the reasons behind the current condition on IT related financial issues will be good addition to the current knowledge. The participant companies might be dealing the IT investment issues differently or in the same way like some other companies that are discussed by the previous researchers,
the reasons behind that will be highlighted from the second part of the research. These findings will give an insight view about the current state of dealing with various IT related financial issues as the findings will explain why the companies are dealing with those issues in the way they are dealing now.

1.5 Scope and Limitations

The scope of this research is to find out the current scenario of various issues of IT finance such as IT investment, IT costs, IT resources, IT business value, benefit management of IT investment, IT tools for operational visibility etc. in the selected seven organizations in Sweden. However, the limitation of this study is, the result of this study cannot be taken as a general view of the Swedish companies in the area of IT finance as quite a small number of companies are going to participate in this study. This study will be done in cooperation with the consultancy company Capgemini and the companies that are going to participate in the survey are selected by Capgemini. So, the author has little control over choosing the companies for survey.

1.6 Disposition

At first in the introduction part the problem area has been discussed. Then the aims and objectives of this thesis have been delineated. Readers will get the idea of the research questions in the next section. The justification of this research has been explained after that. Then Scope and limitations of this research has been highlighted.

The Literature Review part discusses eight different literatures. It discusses capital budgeting techniques for IT investment, the costs of information systems, resource based view of information technology, business value of IT, IT infrastructure investment justification, application portfolio for IT investment, IT tools for real time business integration and benefit management of IT investment. After discussing the literatures, the connection between the literatures and the research objectives has been presented through a table.

The next part is the methodology part where at first the research approach has been discussed. Research strategy has been discussed in detail after that. How the data will be collected is discussed in the next section. Survey strategy, interview plan, data analysis method all are discussed one after another.

In the analysis part, the analysis on survey has been done in the beginning. The respondents will be asked several questions connected to various IT related financial issues. The responses will be helpful to understand the current state of various IT related financial issues in the participant companies. The question related to every financial issue will be analyzed and the survey result will be presented through pie-charts. After analyzing the survey response, the interviews will be analyzed which will give the idea about the reasons behind the current condition of various IT related financial issues in the participant companies.

After analysis comes the discussion part. Here the research questions will be answered with the help of the analysis.

Then the thesis ends by discussing validity of the results, contributions of this research to the filed of information systems and research that can be done in future.
2. Literature Review

2.1 Capital Budgeting Technique for IT Investment

According to Laudon and Laudon (1996), capital budgeting techniques are used for measuring the value of investing in long-term capital investment projects and information systems are considered as long-term capital investment projects. According to Boddy et al (2005), the traditional methods of project investment evaluation express the idea of the costs of an investment need to be related to the benefits which the investment will bring. There are different types of traditional methods of investment evaluation (Boddy et al, 2005; Laudon and Laudon 1996):

2.1.1 Payback Period

This method calculates the number of years required before the cumulative financial returns equal the initial investment. If a company invests $10 million, and expects to receive returns of $2 million each year, the payback period is 5 years. A shorter payback period is more attractive as it means the investment is at risk for less time (Boddy et al, 2005). The limitation of this method is, this method does not consider the time value of money (Laudon and Laudon, 1996).

2.1.2 Accounting Rate of Return on Investment (ROI)

This method calculates the return on the investment by estimating the annual benefits to be achieved over the life of the project, and dividing that number by the amount invested. The annual benefit is calculated as the expected cost savings, additional revenue or whatever other benefits people expect. For the above example, the annual benefit of $2 million would give an ROI of 20 percent (Boddy et al, 2005). This method also does not consider the time value of money (Laudon and Laudon, 1996).

2.1.3 Discounted Cash Flow

In the discounted cash flow (DCF) method, costs and returns are calculated over the expected whole life of the project, but then adjusted for the fact that distant returns are worth less than those that are received soon (Boddy et al, 2005). It considers the time value of money.

2.1.4 Net Present Value

The Net present value can be expressed with the following formula (Laudon and Laudon, 1996): Present value of expected cash flows – initial investment cost = Net present value. The Net present value is the amount of money an investment worth, taking into account its cost, earnings and the time value of money.

2.1.5 Cost-Benefit Ratio

The formula for calculating cost-benefit ratio is total benefits/total costs = cost benefit ratio. So, it is a method for calculating the returns from a capital expenditure by dividing total benefits by total costs.

2.1.6 Internal Rate of Return

Internal Rate of return is defined as the rate of return or profit that an investment is expected to earn. It considers the time value of money (Laudon and Laudon, 1996).
2.2 The Costs of Information Systems

David et al (2002) state that Total cost of ownership (TCO) is a measure often used to assess the effectiveness of an organization’s IT expenditures. TCO covers all expenses related to owning and maintaining IT systems. Boddy et al (2005) describe different types of costs of information systems. They emphasize on two costs

- Costs of Purchase
- Costs of Implementation, ownership and change

2.2.1 Costs of Purchase

Boddy et al (2005) mention that the acquisition costs consists mainly of hardware and software.

**Software Costs**

Boddy et al (2005) mention the following software related costs:

- Development costs if built in-house, package and license costs if bought-in
- Operating system software
- Application development tools
- Security encryption packages
- Networking and communication software
- Systems management software
- Database and database management software
- Front-end packages such as office applications (e.g. word-processing, spreadsheets), data analysis packages, presentational software, management information systems, browsers.

**Hardware Costs**

Boddy et al (2005) notify the following hardware related costs:

- Costs of Front end such as monitors, keyboards, control equipment, printers, scanners etc.
- Costs of the middleware, e.g. networking equipment such as cabling, routers, switching devices, encryption devices and other communication linkages.
- Costs of back end, e.g. processing equipment such as servers, mainframes, desktop PC units etc.

Boddy et al (2005) emphasize that for considering the total cost of a large project, it is good to separately consider the elements of the new system that could be described as infrastructure. These kind of elements can be used by more than one system.

2.2.2 Costs of Implementation, ownership and change

Boddy et al (2005) mention that information systems deals with variety of implementation costs which include:

- Reengineering current business processes
- Decommissioning and disposing of existing systems
- Staff communication and training
- Costs of parallel running during the rollout period
- Error correction and compensation for quality ‘dip’ during initial use of the new system.

Boddy et al (2005) point out that the above mentioned costs are often ignored by those who propose and approve the projects.

According to Boddy et al (2005), costs of ownership will include:

- Support: help desk functions, user manuals, retraining of staff

---

5
• Disaster Recovery: duplication of facilities at alternative sites to ensure continuity of operation in the event of major problems at the main site
• Staff: recruiting development staff, training developers, maintainers and users
• Maintenance: Hardware and software bring the costs of minor enhancements, bug-fixes and request for changes.
• Obsolescence: If the product does not comply with industry standard, it will be soon obsolete.
• Upgrade: Both hardware and software are likely to need upgrading for meeting the communication standards, regulatory changes, new market requirements, expanded applications or new processes.

David *et al* (2002) also discusses about the following costs:

**Direct costs:** The costs that are directly attributable to a specific IT service. These kind of costs are easy to calculate.

**Indirect Costs:** Indirect costs are those that are shared among multiple services. This cost is difficult to calculate as they include costs incurred by users who do their own jobs on a system, spend time for learning or unauthorized time spent such as surfing the internet for personal purpose.

**Variable costs:** These include costs that are not fixed but vary depending on things such as number of users or number of running instances.

**Labor costs:** This is an important cost to calculate. Organizing personnel costs across financial centres based on a service orientation is a viable model for aligning personnel cost to the IT service.

### 2.3 Information Technology and the Resource Based View

According to Bharadwaj (2000), there are three types of IT resources, 1) Physical IT infrastructure, 2) Human IT resources and 3) the intangible IT enabled resources

#### 2.3.1 Physical IT infrastructure

The physical IT assets which form the core of a firm's overall IT infrastructure comprise the computer and communication technologies and the shareable technical platforms and databases. Bharadwaj (2000) emphasizes that a firm's IT infrastructure has been described as a major business resource and a key source for attaining long-term competitive advantage. The infrastructure strengthens a firm's competitive position by enabling initiatives such as cycle time improvement, cross-functional processes, and cross-selling opportunities (Sambamurthy and Zmud 1992, cited in Bharadwaj, 2000). Bharadwaj (2000) mentions that IT platform determines the business degrees of freedom a firm enjoys in its business plans. A non-integrated IT infrastructure dominated by system incompatibilities severely restricts an organization's business choices. Creating an integrated IT infrastructure, however, requires both considerable time and expertise. As firms develop IT infrastructures that span entire organizations, linking key suppliers and customers, they evolve elaborate rules regarding the distribution and management of hardware, software, and other support services (Bharadwaj, 2000). Although the individual components that go into the infrastructure might look simple, the process of integrating the components to develop an infrastructure adjusted to a firm's strategic context is not simple and not perfectly understood (Weill and Broadbent 1998, cited in Bharadwaj, 2000). Successful firms also learn to redesign their products and services in a manner that exploits their infrastructure capabilities. For example, developing a new order processing system may require the infrastructure services of mainframe processing, customer databases, personal computers, local area and national communication networks. Having these components in place will significantly reduce the time and cost to build the system.
Resource-based theorists contend that physical assets, in and of themselves, can serve as sources of competitive advantage only if they "outperform" equivalent assets of competitors (Barney, 1991). As IT systems can be purchased or duplicated fairly easily by competitors, it is often said that physical IT resources are unlikely to serve as sources of competitive advantage (Mata et al., 1995). This kind of reductionist view of technology, however, tries to value the infrastructure only in terms of its individual components and ignores the contributing benefits of integrated systems (Bharadwaj, 2000). Whatever simple the technology components may look, the architecture that removes the barriers of system incompatibilities and makes it possible to build a corporate platform for launching business applications is clearly not an ordinary commodity (Keen 1991).

2.3.2 Human IT Resources

Organizational human resources generally refer to the training, experience, relationships, and insights of its employees (Barney, 1991). The critical dimensions of human IT resources include: (1) technical IT skills, such as programming, systems analysis and design, and competencies in emerging technologies, and (2) the managerial IT skills, which include abilities such as the effective management of IS functions, coordination and interaction with user community, and project management and leadership skills (Bharadwaj, 2000). According to Bharadwaj (2000), firms with strong human IT resources are able to (1) integrate the IT and business planning processes more effectively, (2) conceive of and develop reliable and cost effective applications that support the business needs of the firm faster than competition, (3) communicate and work with business units more efficiently, and (4) anticipate future business needs of the firm and innovate valuable new product features before competitors. The managerial ability to coordinate the complex activities associated with the successful implementation of IT systems has been found to be a key distinguishing factor of successful firms (Sambamurthy and Zmud 1992, cited in Bharadwaj, 2000). Technical and managerial IT skills typically evolve over long periods of time through the accumulation of experience (Bharadwaj, 2000). Furthermore, managerial IT skills are often tacit, dependent on other interpersonal relationships which may take years to develop (Mata et al. 1995), and tend to be highly local or organization specific (Sambamurthy and Zmud 1997, cited in Bharadwaj, 2000). For example, creating a user community that welcomes technological change and embraces new systems takes several years over which the IS group has to engage in mutual trust building and commitment to shared goals. Similarly, application development skills such as those needed for large software development projects often require interactive teams of IT staff that are far more permanent than individual members. These teams develop distinctive styles and coordination mechanisms, which are perfected overtime through learning-by-doing and repetition (Bharadwaj, 2000).

2.3.3 IT-enabled Intangibles

Customer Orientation

The emphasis on customer orientation is apparent in virtually every industry, and the positive impact of customer orientation on firm performance has been widely documented (Bharadwaj, 2000). In achieving high levels of customer orientation, firms have found IT to be an indispensable factor. In fact, customer orientation strategies such as customer relationship management are rooted in the core IT capability of the firm (Bharadwaj, 2000).

Knowledge Assets

A key aspect of a firm's intangible resources is its intellectual capital or knowledge assets. This is embedded in the skills and experience of its employees, as well as in its processes, policies, and information repositories. A firm's knowledge capital is widely recognized as a
unique, not imitable, and valuable resource (Prahalad and Hamel 1990). The relationship between organizational knowledge and competitive advantage is moderated by the firm's ability to integrate, transfer, and apply knowledge (Matusik and Hill, 1998). According to Nonaka and Takeuchi (1995), knowledge management requires a commitment to create new task-related knowledge, spread it throughout the organization, and include it in products, services, and systems.

**Synergy**

As Bharadwaj (2000) mentions, Synergy refers to the sharing of resources and capabilities across organizational divisions. Beyond operational efficiencies, knowledge and information sharing across functional units enables firms to be more flexible and to respond faster to market needs. Brown and Duguid (1998) point out that information technologies geared toward creating organizational synergies can aid in the delivery of needed resources by removing the physical, spatial, and temporal limitations to communication.

**2.4 Business Value of IT**

Brynjolfsson and Hitt (2000) show in their research, how investments in information technology are linked to higher productivity and organizational transformation, with emphasis on studies conducted at the firm level. A significant component of the value of information technology is its ability to enable complementary organizational investments such as business processes and work practices; and, these investments, in turn, lead to productivity increases by reducing costs and, more importantly, by enabling firms to increase output quality in the form of new products or in improvements in intangible aspects of existing products like convenience, timeliness, quality, and variety (Brynjolfsson and Hitt, 2000).

**2.4.1 Impact of IT on the firm’s performance**

**2.4.1.1 Transforming the Firm**

Brynjolfsson and Hitt (2000) describe a case study of “MacroMed” (a pseudonym), a large medical products manufacturer. In a desire to provide greater product customization and variety, MacroMed made a large investment in computer integrated manufacturing. This investment also coincided with a calculated list of other major changes including: the elimination of piece rates, giving workers authority for scheduling machines, changes in decision rights, process and workflow innovation, more frequent and richer interactions with customers and suppliers, increased lateral communication and teamwork, and other changes in skills, processes, culture, and structure.

The resulting productivity improvements were significant enough that management ordered all the factory windows painted black to prevent potential competitors from seeing the new system in action. While other firms could readily buy similar computer controlled equipment, they would still have to make the much larger investments in organizational learning before fully benefiting from them and the exact recipe for achieving these benefits was not trivial to invent. Similarly, large changes in work practices have been documented in case studies of information technology adoption in a variety of settings (Brynjolfsson and Hitt, 2000).

**2.4.1.2 Changing Interactions with Suppliers**

According to Brynjolfsson and Hitt (2000), because of the problems of coordinating with external suppliers, large firms often produce many of their required inputs in-house. Brynjolfsson and Hitt (2000) mention that General Motors is the classic example of a company whose success was facilitated by high levels of vertical integration. However, technologies such as electronic data interchange, Internet-based procurement systems, and
other interorganizational information systems have significantly reduced the cost, time and other difficulties of interacting with suppliers. For example, firms can place orders with suppliers and receive confirmations electronically, eliminating paperwork and the delays and errors associated with manual processing of purchase orders (Johnston and Vitale, 1988, cited in Brynjolfsson and Hitt, 2000). Even greater benefits can be realized when interorganizational systems are combined with new methods of working with suppliers (Brynjolfsson and Hitt 2000).

2.4.1.3 Changing Customer Relationships

Brynjolfsson and Hitt (2000) mention that the internet has opened up a new range of possibilities for enriching interactions with customers. Dell Computer has succeeded in attracting customer orders and improving service by placing configuration, ordering, and technical support capabilities on the web. It coupled this change with systems and work practice changes that emphasize just-in-time inventory management, build-to-order production systems, and tight integration between sales and production planning (Brynjolfsson and Hitt, 2000). Dell has implemented a consumer-driven build-to-order business model, rather than using the traditional build-to-stock model of selling computers through retail stores, which gives Dell as much as a 10 percent advantage over its rivals in production cost. Some of these savings represent the elimination of wholesale distribution and retailing costs (Brynjolfsson and Hitt, 2000). Others reflect substantially lower levels of inventory throughout the distribution channel. However, a subtle but important by-product of these changes in production and distribution is that Dell can be more responsive to customers (Brynjolfsson and Hitt, 2000). When Intel releases a new microprocessor, as it does several times each year, Dell can sell it to customers within seven days compared to eight weeks or more for some less Internet-enabled competitors. This is a nontrivial difference in an industry where adoption of new technology and obsolescence of old technology is rapid, margins are thin, and many component prices drop by 3 to 4 percent each month. For instance, web retailers like Amazon.com provide personalized recommendations to visitors. As described by Denise Caruso (1998, cited in Brynjolfsson and Hitt, 2000), “Amazon’s on-line account maintenance system provides its customers with secure access to everything about their account at any time. Such information flow to and from customers would paralyze most old-line companies.”

2.4.1.4 Impact on Productivity

Brynjolfsson and Hitt (2000) point it out that estimates of the average annual contribution of computer capital to total output generally exceed $0.60 per dollar of capital stock often by a substantial margin, depending on the analysis and specification. These estimates in most cases significantly exceed the expected rate of return of about $0.42 per dollar (Brynjolfsson and Hitt, 2000). This suggests either abnormally high returns to investors or the existence of uncalculated costs or barriers to investment. Similarly, most estimates of the contribution of information systems labor to output exceed $1 for every $1 of labor costs (Brynjolfsson and Hitt 2000).

In the manufacturing industry, it is found that the most productive metal-working plants use computer-controlled machinery. It is found that plants where a larger percentage of employees use computers are more productive in a sample containing multiple industries. Computerization has also been found to increase productivity in government activities both at the process level, such as package sorting at the post office or toll collection (Brynjolfsson and Hitt 2000).
2.5 IT Infrastructure Investments Justification

Infrastructure contributes to the delivery of business benefits in a number of different ways, and the justification of expenditure, either for procurement of capital items or purchasing software licenses or network or hardware capacity from third-party suppliers, needs to be presented on the basis of the particular contributions being made. This can be described under five key points (Ward and Peppard, 2002):

2.5.1 Application-specific Investment
Infrastructure costs can be justified in part on the basis of the benefits delivered by applications that will use the infrastructure, and the relevant costs should form part of the business justification for those applications. This implies a link between the planned applications portfolio developments and the infrastructure required to enable them. This can be done via a composite Benefits Dependency Network, showing infrastructure components as the enablers of the applications, business changes and benefits (Ward and Peppard, 2002).

2.5.2 To reduce costs of running and supporting existing applications
This is most likely to arise in relation to support or some key operational applications as well as personal productivity and communications usage. The justification will depend on cost savings, mainly in the IT budget, but there may be business cost savings, especially by providing easier-to-use desktop tools or lower-cost means of communication. Included in this category is the ‘forced’ need to replace a technology that is or is becoming obsolete i.e. it will no longer be supported or is no longer available because the vendor has ceased to supply the technology or even gone out of business. As with any technology investments that involve supporting existing applications, it is prudent to question whether each application is still necessary to the business. If it is, there may be several options (Ward and Peppard, 2002):

- transferring the application to other existing technology already in use in the business, which may be a less efficient solution, or through replacement with new technology more in keeping with IT policies relating to nominated platforms and standardization across the business;
- modifying or redeveloping the application to take advantage of more cost-effective technology, either existing or new;
- cutting down the functionality of the application to the essentials and delivering them by one or other of the above means.

2.5.3 To enable growth in the volume of business transactions
The growth in transaction volume may be due to changing business practices rather than genuine business volume increases. Customers are tending to move to just-in-time satisfaction of requirements and more single-line ordering rather than consolidating purchases, causing further increases in internal transactions, but still expect rapid response and high service levels. In combination, these create increasingly high-peak loads as well as overall increases in transaction volumes. At the same time, more information is being transferred in many of the transactions e.g. in the form of multiple large attachments to emails, complex images and video, requiring further network, processing and storage capacity increases (Ward and Peppard, 2002).

2.5.4 To bring changes in working practices
This means deliberate changes as opposed to emergent changes as in Item 3 above, although improved practices developed informally should be extended and built on, based on the benefits that have resulted. Such changes may be associated with specific applications, in
which case the benefits should be related via the application to the associated infrastructure. However, increasingly, changes in processes and practices can be made via the use of the infrastructure without major application investment. For example, a bank, having set up its ‘product catalogue’ on an internal website, stopped sending product update information on paper to its several hundred branches. Two benefits resulted: a large paper cost saving and fast, consistent, up-to-date information to customers in the branches. Filing the mass of paper received in the branches was a problem, often leading to delays in staff having the latest information at the counter (Ward and Peppard, 2002).

2.5.5 To create a new business capability
While the details of how the intention will be fulfilled may be unclear, a demonstrated connection between the IT infrastructure and the strategy can often be made. For example, an energy company stated that one of its strategic intentions was to become location independent, enabling its technical and professional staff to perform their jobs wherever in the world they happened to be. This was the main justification for a major investment in network capacity and portable workstations, although benefits in other categories were also delivered (Ward and Peppard, 2002).

2.6 Assessment of IT Investments based on application portfolio
Ward and Peppard (2002) describe that it is important to base the assessment of application investments on the overall nature of the contribution they are expected to deliver to the business. The portfolio approach can offer help in making such judgments. The rationale for developing applications or investing funds and resources in each segment of the matrix is different, therefore the evaluation process should be different. The arguments used to justify a prototype system to model customer online buying behavior are not the same as those used to justify a replacement of the general accounting system. Equally, response to a competitor’s online service, which is causing customer attrition, and a decision to bring together data from disparate applications in a data warehouse require different approaches to evaluation. The risks and consequences of failure in the various segments are also different. This can be allowed for by requiring a higher predicted rate of return where the risk is higher, although this may in turn merely lead to creative accounting for the benefits! It is perhaps better to analyze the inherent nature of the risks and take appropriate action to deal with them, as far as possible, as will be outlined later. The portfolio approach suggests that (Ward and Peppard, 2002):

- Quantified, financial justification of applications is easier in the key operational and support applications, where most aspects of the application will be better known or can be determined, risks are lower and the rate of change is slower.
- A singular approach to investment justification will tend to produce one type of application to the exclusion of others. This argument is particularly strong where a scarce resource approach has been adopted and pure financial return on investment decides investment priorities. So, support applications will always be easier to justify financially.
- The way in which applications are planned and managed by the organization will also affect the way in which they are justified. It does not matter whether they are customer-related applications integral to achieving business objectives or systems intended to save major costs in one part of the organization.

The following figure shows the investments evaluation based on application portfolio
The following discussion focused on what should be the investment decision on different type of application systems (Ward and Peppard, 2002):

### 2.6.1 Support Application

McFarlan (1984) explains that support application are those that are valuable but not critical to for organization’s success. According to Ward and Peppard (2002), the main argument for such systems is improving efficiency, which should be possible to quantify and convert into a financial argument for investment. Additional arguments may revolve around system and technology obsolescence and general staff productivity/time saving, and these may be difficult to identify accurately and therefore to quantify. In this segment, it is reasonable to expect potential benefits to be estimated before resources and costs are acquired. It is necessary to identify the most economic solution within the benefits achievable. Again, if the application is competing with others for the limited resource, then a support application must show a good economic return for the allocation of a scarce resource. If, however, the project can be carried out within the user department’s control, then it is reasonable that, since the budget or funding is under local control, the decision of investing or not investing is made by local user management. The IS/IT investment is an alternative use of funds to other investments locally and is not competing with alternative use of scarce IS/IT resources. It is to be hoped that user management will expect the case to be argued in predominantly financial terms, but if not that is their responsibility. In summary, assuming a scarce resource strategy is being adopted centrally for most support applications, then any allocation of that resource should be argued on economic, return-on-investment grounds primarily. At the same time, some judgment can, without great risk, be left to local management via a free-market strategy. (Ward and Peppard, 2002).

### 2.6.2 Key Operational System

McFarlan (1984) describes that Key Operational Systems are those systems on which the organization is currently dependent for success. The business may suffer a serious disadvantage if a key operational system fails or becomes less adequate in meeting the business needs as they evolve. It might be worth spending more to achieve a more adaptable...
or integrated solution that meets a range of needs more effectively and upon which new strategic applications can be built.

For key operational systems, the business unit management should be the final arbiter. It is their business that will suffer by lack of investment and they should (provided they can afford to pay) be allocated the necessary resource to meet such systems needs. It is clearly untenable to allow competitive disadvantages to develop due to lack of investment in IS/IT (Ward and Peppard, 2002).

2.6.3 Strategic Applications

McFarlan (1984) explain that support application are those that are critical to sustaining future business strategy. The fact that an application is deemed strategic implies that it is integral to achieving aspects of the future business strategy. Obviously, it is important to cost the investment and, where possible, put figures to the potential benefits, even if the latter are only ranges or orders of magnitude, not estimates suitable for a discounted cash-flow calculation. However, the main reasons for proceeding are likely to remain mainly non-financial (Ward and Peppard, 2002).

A key issue is whether the management team, steering group or whoever makes such decisions is unified in endorsing the project and that the ‘organization’ deems the investment worthwhile. The critical factor is then resourcing the task sufficiently to achieve the objectives in the optimum timescale. This may need repeated senior management intervention to ensure that both user and IT resources are made available. The budget for such investments and financial control of actual expenditure should perhaps reside with the steering group to ensure that progress and resourcing are centrally monitored as well as planned (Ward and Peppard, 2002).

2.6.4 High Potential Applications

McFarlan (1984) defines High Potential Applications that may be important in achieving future success. The most important thing of high potential projects is that the benefits are unknown and the objective is to identify the potentially available benefits and how they could be achieved. It should be justified on the same basis as any other type of R&D, and preferably from a general R&D budget rather than IS/IT funds. In practice, where the money comes from—R&D budget or IS/IT or user budgets—is important, but not critical. What matters is not pouring money without proper monitoring. It must be remembered that many high potential ideas tend to arise informally, based on individuals’ creative thinking, rather than from formal planning, and it is important not to prevent creativity through excessive bureaucracy. IS/IT investments should be considered just as objectively and just as subjectively as other business investments. The portfolio approach allows the balance to vary according to the expected contribution required (Ward and Peppard, 2002).
2.7 IT tools for real time Business Integration for better operations visibility

As Vojdani (2003) describes, business integration platforms, enable companies to improve integration of information systems, integration with partners, automation of business processes and workflow, and real-time visibility into the operations. This is an important component in building a flexible, scalable, fault tolerant, secure, standards-based, IT architecture. It reduces application development and maintenance costs, and it allows optimal application arrangement where systems can be expanded incrementally by plugging in new applications into a message bus.

2.7.1 Elements of Business Integration Platform

Vojdani (2003) explains that a business integration platform usually involves several elements, for most companies, business integration begins with EAI (Enterprise Application Integration). EAI solutions consist of an internal middleware layer that connects business applications with one another across the local-area network or intranet, regardless of differences in data formats. It ensures that data can move between these applications easily. EAI is typically based on anonymous subscribe messaging technology, where applications publish messages to a message bus and/or subscribe to certain messages on the message bus. The message bus can provide guaranteed delivery of the messages to the subscribing applications (Vojdani, 2003). A combined architecture often ensures flexibility, scalability, and fault tolerance (Vojdani, 2003).

In his research, Vojdani (2003) later describes that B2B integration (B2Bi) extends the scope of EAI to ensure the reliable and secure exchange of data with external business partners and suppliers. The medium for this exchange is of course the Internet or, in the case of an electronic data interchange (EDI) solution, the value-added network (VAN). Most financial transactions are likely to use EDI or XML standards, and there may be a need to convert transactions from one of these formats into the other. A variety of B2Bi applications are available for the utility industry. They support integration with a wide variety of entities, including procurement exchanges, energy exchanges and financial exchanges, as well as customers, suppliers and other partners. They can support data exchange with government agencies, industry groups, other companies and other industries. In some cases, they may be accompanied by the implementation of an electronic storefront for customer self-service, partner self-service or employee self-service.

Vojdani (2003) mentions that neither EAI solutions nor B2Bi solutions incorporate the ability to control and manage the flow of information and transactions from a central point. The underlying applications merely push and pull data as instructed; they have no understanding of the overall business process. Because of this inability, most business integration platforms require another important element, known as business process management (BPM).

BPM provides the intelligent business processing logic that is required to coordinate and monitor the exchange of information and transactions with business partners and internal business applications. Although it is possible for companies to create their own bespoke applications for BPM, this involves lengthy development periods and complex coding, and is usually very expensive. The alternative is to apply a BPM tool that can be used to graphically define and then control the flow of data among internal and external applications.

2.7.2 Benefits of Business Integration tools

According to Vojdani (2003), with business integration platforms, utilities have the opportunity to automate their processes to a degree that was not possible in the past. These
Platforms support the seamless integration of computer systems and business processes throughout the electricity value chain, enabling eBusiness and collaboration among business partners. Some of the specific benefits to utilities are (Vojdani, 2003):

- Lower IT interface development cost, interface maintenance costs, and application monitoring costs.
- Increased ability to implement planned changes in the existing systems, integrate the needed new systems, in the time frame needed, and react to the changing deregulation.
- Protecting the investment in legacy systems and prolonging their lives.
- Increased operation efficiency and workforce productivity through
  i. Automation of business processes and work flow (e.g., energy bid preparation, settlement, billing,
  ii. payment processing, maintenance, procurement, inventory management).
  iii. Reduction in manual data entry and errors
  iv. Higher accuracy and consistent information
  v. Timely access to information
  vi. Real-time visibility into events
  vii. Customer self-service via customer portal
  viii. Employee self-service via employee portal
- Visibility into operation and real-time Key Performance Indicators via operation/executive portal.
- Increased customer satisfaction by meeting customers’ demand for information.
- Potential for increased revenues through better access to power market data in real-time, and quickly reacting to changes.
- Increased information security, and the ability to implement sophisticated communications and physical security.
- Increased ability to “plug-and-play” “best-of-breed” applications.
- Increased flexibility to outsource specific applications or business functions.
- A scalable, fault-tolerant, high performance, flexible IT architecture responsive to business changes.

2.8 Benefit Management of IT Investment

Ward and Peppard (2002) explain that IT investment appraisal or estimation should be considered as an important event within an overall process that can be mentioned as Benefit Management. Ward and Peppard (2002, p. 439) define Benefit Management as “the process of organizing and managing such that potential benefits arising from the use of IT are actually realized”.

Ward and Peppard (2002) add that the ability to achieve benefits from a particular investment will depend largely on the organization’s experience and knowledge of what types of benefit IS/IT investments can or cannot deliver and how they can be obtained. Benefit Management process considers of three things (Ward and Peppard, 2002):

i. Why is the investment being made: what is causing the organization to change by investing on IT?
ii. What types of benefit is the organization expecting from the investment overall: does the organization want to reduce costs, improve operational performance, gain new customers, create a new capability, etc.? These need to be understood in general terms before detailed analysis of potential benefits in relation to the extent of change required is undertaken.
iii. How will other activities, strategic initiatives, business developments or organizational issues affect the particular investment either to facilitate or inhibit its progress and outcome?
Ward and Peppard (2002) add that the purpose of any IS/IT investment is to deliver improvements to business and/or organizational performance and it would be logical that the benefits management process should be the main process and around this process everything should suit.

2.8.1 Benefit Management Process

The following figure shows the benefit management process:

![Figure 2: Process Model of Benefit management (Ward and Peppard, 2002)](image)

**Stage 1: Identification and Structuring of Benefits**

As Ward and Peppard (2002) mention, identifying the target benefits means an iterative process of establishing the investment objectives and the possible business performance improvements that the system and associated changes should or could deliver. The achievement of each objective could well deliver a variety of different benefits across the organization and also to trading partners and customers: customer service improvements in one area could produce new marketing or selling opportunities; productivity gains in administration may release resources for front-office activities. The process is inevitably iterative since objectives may be modified and new benefits identified as ideas and options are considered in the creative stage discussion, or perhaps rejected after more careful scrutiny. The benefits should also be tested against the benefit drivers in the organization, to ensure they are relevant and that investment to achieve them will be endorsed by senior management. All business performance improvements are measurable, and hence so are all the benefits delivered by information systems. Some can be measured directly in relation to the system. Many of these can also be easily converted into financial values; where this can be done, it should be, to enable an economic appraisal to be made. In other cases, the measurement may be less direct. Better timing and control of deliveries should lead to more satisfied customers, which in turn may lead to increased sales or at least avoiding lost sales due to delivery problems. The level of customer satisfaction will need to be measured and some estimate made of the business benefits of improved delivery. These quantified benefits may not, however, be suitable to undergo rigorous discounted cash-flow calculations. In essence, every target benefit should be expressed in terms that can, in due course, be measured, even if the measure will be subjective (Ward and Peppard, 2002).
The final part of this stage is the determination of where in the business each benefit should occur and, hence, who in the organization should be responsible for its delivery. This is a logic often overlooked in bringing in new systems, but ‘ownership’ of each of the benefits and clear allocation of responsibility for delivery is essential to success. This is easy to identify if the system is mainly within one function or area of the business, but it is more difficult when the system crosses functions, and especially when reorganization and rationalization of tasks across functions are integral to the delivery of benefits (Ward and Peppard, 2002).

Stage 2: Planning Benefits Realization

Ward and Peppard (2002) explain that having identified and allocated responsibility for benefits to individuals, the next step is to determine the changes required for delivery of each benefit and how the IS/IT development will enable the changes and benefits to occur. The output from this activity is described as a benefit dependency network, which relates the IS/IT functionality via the business and organizational changes to the benefits identified. Developing such a cause–effect network is again an iterative process best conducted in a workshop mode, since, as changes required are identified, a network of interrelating changes and dependences will evolve, and the feasibility of achieving some of the benefits will be questioned.

Before the network and resulting benefits plan can be finalized and a sound business case proposed, a thorough stakeholder analysis is required to check the feasibility of achieving all the changes on the network. The purpose of stakeholder analysis is to understand those organizational factors that will affect the organization’s ability to achieve the required improvements. The first task is to establish who all the stakeholders are with respect to the investment. In reality, anyone affected by the system or the process of development is a stakeholder, and the view they take of the investment may influence the outcome (Ward and Peppard, 2002).

The main objective of stakeholder analysis is to address what every stakeholder will get from the IS/IT investments. Often, projects fail because of the lack of cooperation of parties who were not considered material to the system’s success, but whose ability or willingness to accept change or otherwise is essential, requiring their active cooperation in delivering the real business improvements required. At the same time, what adverse impacts on the business, organization or particular stakeholder groups may have from the system should also be considered. (Ward and Peppard, 2002).

How the case for investment has to be described to senior management will depend on the processes and procedures in the organization. The case should start with the context within which the need for investment in change has arisen—the drivers. The objectives for the investment, that means the situation that should exist on a successful completion should be linked to the specific business drivers that will cause investment should follow (Ward and Peppard, 2002).

Stage 3: Executing the benefits plan

Ward and Peppard, (2002) describe that as with any plan, the next stage is to carry it out and adjust it as necessary, as issues arise affecting its achievement. Monitoring progress against the activities and deliverables of the benefits plan is just as important as for the IS/IT development plan, and the two plans are components of the overall project plan. It may be necessary to establish interim targets and measures to evaluate progress toward key milestones or the final implementation. It is the business project manager’s responsibility to decide what action to take in terms of reviewing the scope and specification of the system or its business justification. During this stage, further benefits may also be identified, and again the business project manager should decide on appropriate action to plan for the benefit or
defer it until Stage 5. Equally, it may become apparent that intended benefits are no longer feasible or relevant and the benefits plan should be modified accordingly, along with any consequent reduction in the IS/IT functionality. Factors outside the benefits plan itself such as changes in the organization or problems in meeting the requirements at the intended cost will, of course, initiate reviews of the project deliverables and plan and, in turn, cause a reassessment of the benefits plan and even the business case.

**Stage 4: Reviewing and Evaluating Results**
Once the new system, business changes and the benefits plan have been implemented, there must be a formal review of what was and was not achieved. This evaluation has two purposes (Ward and peppard, 2002):

- to maximize the benefits of the particular investment;
- to learn how to improve benefits delivery from future investments.

The evaluation should involve all the key stakeholders and focus on what has been achieved, what has not or not yet been achieved and why, and identify further action needed to deliver outstanding benefits, if possible (Ward and Peppard, 2002).

**Stage 5: Potential for Further Benefits**
Much of the research referred to earlier has shown that it is often impossible to identify all the benefits of a system in advance. Further benefits often become apparent only when the system has been running for some time and the associated business changes have been made. If, as has been suggested, more benefits are actually identifiable after the event than before it, where there is no review process these will probably never be identified. Therefore, having reviewed what has happened, it is equally important to consider what further improvement could now be possible as a result of implementing the system and associated changes (Ward and Peppard, 2002).

In my current study of IT financial management, the Benefit Management model will be helpful to understand what kind of benefit management plan the Swedish organizations follow before or after investing on IT. It will be interesting to find out whether the organizations identify the benefits of IT before investing money on it.
2.10 Connection between the Theories and Research Objective

The following table shows the relationship between the theories and the reason behind using them in this research:

<table>
<thead>
<tr>
<th>Theories</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Costs of Information Systems</td>
<td>1) To find out the current states of calculating various IT-related costs</td>
</tr>
<tr>
<td>2) Use of Capital budgeting technique for IT investment</td>
<td>2) Finding out which method the companies use for capital budgeting for IT</td>
</tr>
<tr>
<td>3) Assessment of IT investment based on application portfolio</td>
<td>3) To investigate the company's use of application portfolio</td>
</tr>
<tr>
<td>4) Tools for Business Integration</td>
<td>4) To find out whether the companies are using EAI or B2Bi for business integration that will provide operations visibility, i.e., helpful for cost reduction</td>
</tr>
<tr>
<td>5) Resource based view of IT</td>
<td>5) To find out companies' knowledge about the impact of IT resources on their business</td>
</tr>
<tr>
<td>6) Business value of IT</td>
<td>6) To find out companies' knowledge about business value of IT as it may effect the investment decisions</td>
</tr>
<tr>
<td>7) IT infrastructure investment Justification</td>
<td>7) To find out why companies invest on IT infrastructure investment</td>
</tr>
<tr>
<td>8) Benefit management of IT investment</td>
<td>8) To find out how the benefit management of IT investment is done in the companies.</td>
</tr>
</tbody>
</table>

Table 1: Connection between Theories and Research objectives
3. Research Methodology

3.1 Research Approach
The approach for this research will be pragmatic approach as pragmatism is real-world practice oriented (Creswell 2003, p. 6) and the current research deals with a real-world practice, i.e. the current condition of various IT financial issues such as IT investment, IT cost, IT resources etc and to find out the reason behind that condition. Moreover, in pragmatic approach the world is not seen as an absolute unity (Creswell 2003, p. 7) and in this research the researcher looks to collect data by employing different ways which supports the pragmatic approach.

3.2 Research Strategy

3.2.1 Mixed method Strategy
Mixed method strategy employs multiple ways to collect data (Creswell 2003, p. 14). Survey data can be combined with interviews. Creswell (2003) describes different mixed method strategies, 1) Sequential explanatory strategy, 2) Sequential Exploratory strategy, 3) Sequential transformative strategy, 4) Concurrent triangulation strategy, 5) Concurrent Embedded Strategy, 6) Concurrent transformative strategy. Among all these mixed method strategies, sequential explanatory strategy is the best for current research. The reasons are given in the next segment.

3.2.1.1 Sequential Explanatory Strategy
Sequential Explanatory strategy is characterized by the collection and analysis of quantitative data in the first phase of the research followed by the collection and analysis of qualitative data in a second phase that builds on the results of the initial quantitative results (Creswell 2003, p. 211). The current research supports the sequential explanatory strategy as at the first phase of research, a survey is conducted in the selected organization in Sweden to get the knowledge of the current condition regarding various IT financial issues such as IT investment, IT costs, IT resource, IT business value, benefit management of IT investment etc. And then interviews will be conducted to understand the reasons behind the conditions of the issues that are mentioned. Without interviews, it will not be possible to get a deep understanding of the survey results. So, the current research suits the sequential explanatory strategy of mixed method and sequential explanatory strategy is the right strategy for the current research.

3.3 Data Collection
Survey and interviews are the data collection methods of this research. Data will be collected by doing survey on the IT managers working in seven different types of organizations in Sweden. The survey will be done in cooperation with the IT consultancy company Capgemini. There are several close-ended questions. All the questions are made with the help of the literature review that was discussed earlier. Questions will be asked regarding the use of Capital budgeting technique for IT investments, costs of information technology, Assessment of Investment based on application portfolio, Justification of IT infrastructure investment, Benefit management of IT investment, knowledge about the impact of IT resources, IT business value etc. The survey questionnaire has been provided in the appendix. The survey responses will be helpful to understand the current condition regarding various IT financial issues.
After conducting the survey, interviews will be conducted on respondents of the survey to get a better understanding of their responses in the survey questions. The interview responses will be helpful to understand the reasons behind the IT financial issues about which the survey is done.

3.3.1 Companies Selected for Data collection

Company A: This is a company where 4,000 people work in areas that range from forestry management and environmental conservation to accounting, sales and product development. The company's four business areas produce sawn and planed timber goods, interior products, paper pulp and biofuel. In recent years this company has also become such a large producer of electricity that the Group now produces more electricity than it uses. The company has its own IT department to deal with the area of information technology. IT department works as helping hand to the business process of these companies. The IT managers from this company answered the survey questions as a representative of the company.

Company B: This is a Swedish Home Furnishing Retail Company with retail presence in more than 40 countries. The company offers a wide range of well-designed, functional home furnishing products at low price so that many people will be able to afford them. They also have their own IT departments with a good number of IT staffs. The IT managers from this company answered the survey questions as a representative of the company.

Company C: This company produces and supplies energy and energy-related services to approximately one million customers. The goal is success that builds on customer benefits and social responsibility. The route to achieving this is through better service, more efficient use of energy, a growing proportion of renewable energy types and an overall view of the global climate threat. It is one of the world’s largest privately owned energy companies, with 30 million customers. Its own IT department deals with the IT related issues. The IT manager from this company participated in the survey involved in this study.

Company D: This company supplies fresh drinking water in Lund and Malmö. They are actively contributing to a sustainable development. They serve more than 500,000 people every day. The IT department of this company is also helping the company in their day to day business. One of the participants of the survey is an IT manager of this company.

Company E: A large telecom company doing business in mobile communications all over the world. It offers a full range of telecommunication services including mobile and fixed telephony as well as Internet access and content. Their IT department at the office situated in Malmö also has taken part in this survey.

Company F: This is also a famous telecom company of Sweden although not as big as Company E. They have quite a large number of customers in Sweden. They have an office at Malmö and their IT department participated in the survey.

Company G: This is medium size company developing solutions for information and identification for manufacturing industry, healthcare industry, chemical industry. Its main business is making identifiable labels for various type of products. Its IT department helps this current study by taking part in the survey.
3.4 Survey Strategy
This survey will be conducted over the IT managers of seven different organizations in Sweden that are using IT for various type of business. A web survey tool ‘Easy Research’ has been used for preparing the survey questionnaire and sending them to the relevant participant. Questions have been based on the literature review that has been discussed before. Most of the questions are multiple choice questions where the answerer can choose more than one option. There are few yes/no questions. The question regarding capital budgeting technique is a multiple choice question, there are three questions related to costs of IS/IT which are all multiple choice questions. Same in the case of the questions regarding business value of IT, IT resource, application portfolio, IT infrastructure investment justification, challenges in benefit identification. There are single choice questions regarding benefit identification, operations visibility and benefit evaluation after IT system implementation.

As described earlier, the seven companies that have been targeted for the survey are different companies doing business in various things etc. So, they all have different businesses in place and they all have their IT systems. It would be really interesting to know what is the current condition of the above mentioned IT financial issues in these organizations as they are using IT in various businesses.

3.5 Structured Interviews
After the survey, follow-up interviews will be done on four respondents of the survey. As mentioned earlier, the respondents are the IT managers of seven different organizations in Sweden. A structured interview will be done with some predefined questions that will be based on the respondent’s survey responses. Most of the interview questions will seek for the reasons of the survey respondent’s response on some particular issues. The interview questions are provided in the appendix. Interview will be done over telephone.

3.6 Validity and Reliability
Validity of the survey and interview data have been maintained through following steps: Anastasi and Urbina( 1997) mention that content validity can be achieved through the careful selection of items to be included. During the preparation of survey questionnaire, the questions have been selected in such a way that they cover different financial issues related to IT. So, it can be said that the survey data fulfills content validity. To ensure validity, it will be made sure that the collected data from different respondents and interviewees will show their perspective. Moreover, to achieve validity, data has been collected from the IT managers of different organizations who are the best people to answer the questions related to IT finance.

To have a reliable research, the survey questionnaire has been prepared based on the different issues of financial issues of IT discussed in the published articles. Moreover, experience staffs of Capgemini provided assistance while preparing the survey questionnaire that made the data more reliable.
3.6 Data Analysis Method

3.6.1 Survey Analysis Method
As it is mentioned before there will be multiple choice questions with multiple alternatives to choose and single choice question where only one answer to choose. There will be one or more survey questions on various IT financial issues that are discussed in the literature review and data will be analyzed on each issue of IT finance. For example, based on the responses of the question on capital budgeting technique for IT investment, an analysis will be done to understand the current condition of the different organizations in the use of capital budgeting technique for IT investment. For graphical presentation of the survey response, responses on every survey question will be presented by pie charts. As the respondents can have option/options to choose for answering every survey question, responses on each survey question will be analyzed by identifying how many respondents have chosen each option of a survey question. It is for the purpose of identifying the percentage of respondents who will choose a particular option of a survey question. The percentages will be put in MS Excel to get the pie charts that will show the percentage of response on different options connected to each survey questions. So, it will be helpful to graphically present the analysis. The graphical presentation will be more helpful to understand the analysis better. After the analysis, the significance of the analysis will be discussed with the help of the literature review.

3.6.2 Interview Analysis Method
As mentioned before, the interview will be conducted as a follow-up to the survey to get better understanding of the survey responses. Hermeneutics approach has been employed to analyze the interviews. As Myers and Avison (2002) mention, hermeneutics is primarily concerned with meaning of a text and text analogue. Myers and Avison (2002) also explain that the idea of a hermeneutic circle refers to the dialectic between the understanding of the text as a whole and the interpretation of its parts, in which descriptions are guided by anticipated explanations. It follows from this that we have an expectation of meaning from the context of what has gone before.

In this research, the interview responses are written as text and analyzed with the hermeneutics approach where the author tries to get the meaning of the texts.

3.7 Ethical Consideration
During the survey, the replies that will be collected from various staffs of the organizations should be used and analyzed in such a way that it cannot do any harm either to the staffs or to the organizations. There might be some sensitive data collected during the survey and it should not be spread in the market otherwise it will be harmful for that organization.

23
4. Analysis

4.1 Survey Analysis

Seven organizations have been selected for conducting the survey. The IT managers in those organizations answered the survey questions. Eleven IT managers responded from those seven organizations. Two respondents’ answers vary too much with the other respondents and those have been kept aside as the author got responses from IT managers who work in the same companies. So, the analysis is done based on the responses of nine IT managers of those selected seven organizations.

4.1.1 Responses on use of Capital Budgeting technique for IT investment

Participants of the survey who are IT managers working in the organizations were asked about which capital budgeting techniques they use for investment on IT services. As it was a multiple choice question, the participants were given options to choose from Net Present Value (NPV), Payback period, Accounting Rate of Return on Investment (ROI), Cost benefit Ratio, Internal Rate of Return (IRR), Discounted Cash Flow (DCF). They can also choose the option ‘Some other Technique’, ‘Unsure’, ‘don’t have any technique’. Different participants responded differently about the issue of capital budgeting techniques used for IT investment. One participant (11.11%) from a company has answered that they do not have any capital budgeting technique for IT investment. An IT manager (11.11%) of a reputed company has responded that they use most of them such as payback period, ROI, NPV and DCF. Another (11.11%) has said they also use many techniques such as payback period, cost benefit ratio and some other technique. One of them (11.11%) has replied they use DCF, another one (11.11%) has mentioned IRR. Two (22.22%) from other company have said that they use some other technique. Three of the nine participants (33.33%) have answered that they are unsure or don’t know whether they have any capital budgeting technique in place for IT investment.

As we can see in Laudon and Laudon (1996, pp. 425-428), a company can use various budgeting techniques before making investment to check the worth of that investment. Laudon and Laudon (1996) also mention about the strength and weakness of the methods. Laudon and Laudon (1996) mentions that the budgeting techniques such as Net Present Value (NPV), Cost benefit Ratio and Internal Rate of Return (IRR) all consider time value of money, whereas Payback period and Accounting Rate of Return on Investment (ROI) do not consider the time value of money. Discounted Cash Flow (DCF) too considers time value of money.

The purpose of making the pie chart is to have an overview of the responses that have been obtained from the IT managers of the participant companies regarding the use of capital budgeting technique for IT investment. There are few equal size slices in the pie chart as few respondents mention about using different types of capital budgeting techniques. However, the biggest slice of the pie chart is showing the IT managers who respond that they are not sure about the use of any capital budgeting technique for IT investment in their companies. The second largest slice is showing those who say that they use some other technique, not the conventional techniques that are mentioned in the survey question. From the pie chart, it is quite clear that more that half of the respondents are not using the capital budgeting techniques such as NPV, IRR, DCF that consider the time value of money that is mentioned by Laudon and Laudon (1996).
4.1.1 Significance of the Analysis

From the analysis it has become clear that some companies do not use any capital budgeting technique for the investment on IT services. They will not be able to map between the money has been invested on an IT service and the estimated benefit of that investment. This kind of blind investment on IT will not be helpful for an efficient business purpose use of IT.

Some companies are not using either of the NPV, IRR, DCF and cost-benefit ratio. These are the established and tested budgeting techniques. Using the techniques like payback period and ROI means they are not considering the time value of money (Laudon and Laudon, 1996).

So, the overall scenario of capital budgeting process for IT services is not satisfactory in the organizations that participated in the survey.

4.1.2 Responses on cost of IS/IT

Three questions were asked about the costs of IT. First question investigates whether the organizations consider the annual maintenance costs, implementation costs etc. The second question investigates labor cost, variable cost, indirect cost etc and the third questions look at the various aspects of total cost of IT project. These concept about IT/IS costs have been described in Boddy et al (2005) and David et al (2002). Most of the respondents said that they calculate both annual maintenance cost of H/W and S/W and implementation & ownership costs. Five out of nine participants (55.56%) have replied that they are aware of both costs. Two of them (22.22%) have responded that they only calculate annual maintenance cost and two of them (22.22%) responded that they only calculate implementation & ownership cost.

From the pie chart, the similarity in the responses can become clearly visible through the slices of the pie chart as one big slice covers more than half of the pie. That slice is showing the respondents who have said they calculate both the costs and the remaining two smaller slices are showing the people who have said they calculate one of those not both.

Figure 3: Responses on use of Capital Budgeting Technique for IT investment
In the second question about calculation of labor cost, variable cost and indirect cost four out of nine respondents (33.33%) have responded that they calculate all three types of costs: labor cost of personnel, variable cost and indirect costs. According two other (22.22%), they calculate labor cost and variable cost. Two of them (22.22%) have responded that they calculate indirect cost and variable cost. One of them (11.11%) has responded that they calculate only the variable cost and one of them (11.11%) has responded that they calculate only the indirect cost.

On the pie chart, the differences in responses of the survey participants are clearly shown. There are five slices in the pie with two pairs of equal slices. The biggest one which is one-third of the pie shows the respondents who have said they calculate all three types of costs. The pie chart shows the variety in answers among the respondents regarding the issue of calculating labor cost, variable cost and indirect cost.
4.1.2.1 Significance of the Analysis

According to Boddy et al (2005, p. 125), most organizations ignore or underestimate the implementation and ownership costs. In the case above, it has been noticed that the participants from different selected organizations answered that they take care of that cost and also most of them calculate annual maintenance cost. So, here it can be said that they have awareness about it. So, it can be said that they will have a good record of the cost of Annual maintenance of H/W and S/W and also the implementation and ownership cost.

However, the scenario is different regarding the calculation of labor cost, variable cost, indirect cost. Less than half of them said they calculate all the three costs. It is required to track the variable cost otherwise it will be hard to know how much money the organization is spending on variable cost components like software licenses, different types of resources. Not tracking the indirect cost will result in confusion over how much money is spent on different shared services.

4.1.3 Responses about the knowledge about Impact of IT resources

From the responses got form the survey question about the knowledge about the impact of IT resources on business we can see that very few professionals know the effects of the three IT resources (IT infrastructure, Human IT resources and intangible IT enabled resources) on their business. Only two IT managers (22.22%) have said that they know the impact of all three IT resources. Two of them answered unsure/don’t know about the effects of IT resources in the business. Four managers (44.44%) have answered they know the effect of IT infrastructure (which is one of the resources) in their business. One manager (11.11%) has answered that they know the effects of both IT infrastructure and Human IT resources (which are two of the three of IT resources discussed in the literature review) in the business.

On the Pie chart, the biggest slice of the pie shows the IT managers who have said they only know the effect of IT infrastructure on their business. If we go clockwise direction, the next two equal size slices are showing IT managers who know about the effect of all three IT resources on their business and the IT managers who are unsure about the effect of IT resources on their business. The smallest slice shows the IT manager who has said they know the effect of both IT infrastructure and Human IT skill. It is clearly visible from the pie chart that less than one-fourth of the IT managers have the knowledge about the impact of all three IT resources.
So, among the IT professionals who participated in the survey, only two (22.22%) of them know the impact of all three IT resources (IT infrastructure, Human IT resources and intangible IT enabled resources) in their business and few of them have partial idea and few of them answered ‘don’t know’ on that particular question. It is evident from the pie chart that not all the IT professionals have idea about the impact of all the three IT resources (IT infrastructure, Human IT resources and intangible IT enabled resources) in their business. Their answers on this particular survey question show the difference among the IT professionals in the selected Swedish organizations in knowing about the impact of IT resources in business.

4.1.3.1 Significance of the Analysis

So, what does the above analysis mean? Bharadwaj (2000, p. 169) states that many companies invested highly on IT but did not get any significant benefits from it. After doing survey on companies with superior IT capability Bhradwaj (2000) comes to a conclusion that the companies that leveraged IT successfully know how to combine IT resources to create IT capability and finally get competitive advantage over others.

A flexible IT infrastructure when combined with strong human IT skills can develop IT enabled intangible resources and thus becomes an effective organizational capability (Bharadwaj, 2000, 176). Bharadwaj (2000, p. 176) mentions that the companies that invest on IT without developing an IT capability will not get the competitive advantage.

So, we can say that the organizations that have less knowledge about the impact of all of their IT resources in their business will have very little chance of getting competitive advantage as they will not be able to combine their IT resources to create an overall IT capability. From the above analysis presented by the pie chart, we can see that most of the professionals in the selected Swedish organizations do not know the impact of all the IT resources in their business, which means that the possibility of thinking all the IT resources as a business strength or business capability is very less and thus if any company knows only about the impact of IT infrastructure on their business but do not know the impact of Human IT skill IT enables intangibles, the company will invest more on IT infrastructure and less on Human IT skill. That means, lack of knowledge about any of the IT resources will result in
investing more on one particular resource and less on another one and thus failure to create IT capability as it can only be earned by combining all the three IT resources.

From the above discussion it is clear that the companies which are not aware of the effects of all three IT resources on their business cannot develop IT capability as they do not know how different IT resources are effecting their business. So, those companies will make wrong decisions while they will do their budgeting or doing new investment.

4.1.4 Responses about knowing the Business value of IT

When the professionals were asked about whether they know about the following business values of IT such as transformation of the firm using IT, changing customer relationship with IT, changing interactions with suppliers and improving productivity with IT different responses were achieved. The business values of IT mentioned above have been referred from Brynjolfsson and Hitt (2000) that has been described in the literature review.

IT Manager1 has responded that he knows about how IT can be used for changing customer relationship. Manager2 has said that he knows about both changing customer relationship with IT and improving productivity with IT. Manager3 and Manager5 both said they only know that IT can improve productivity. They do not know about the other business values. Manager6 says he knows both about improving productivity and changing interactions with suppliers. Only one IT manager (manager7) has said that he knows all the business values of IT. Manager8 says that she knows about improving productivity with IT, changing customer relationship and changing interactions with suppliers. Manager9 says he knows about IT can be used for company transformation, changing customer relationship and improving productivity. We can make a summary of their response in the following way,

<table>
<thead>
<tr>
<th>IT Manager</th>
<th>Awareness of the business value of IT</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT Manager1</td>
<td>Knows about changing customer relationship with IT</td>
</tr>
<tr>
<td>IT Manager2</td>
<td>Knows about changing customer relationship and improving productivity</td>
</tr>
<tr>
<td>IT Manager3</td>
<td>Knows about improving productivity</td>
</tr>
<tr>
<td>IT Manager4</td>
<td>Don’t know/unsure</td>
</tr>
<tr>
<td>IT Manager5</td>
<td>Knows about improving productivity</td>
</tr>
<tr>
<td>IT Manager6</td>
<td>Knows about improving productivity, changing interactions with suppliers</td>
</tr>
<tr>
<td>IT Manager 7</td>
<td>Knows about all business values</td>
</tr>
<tr>
<td>IT Manager 8</td>
<td>Knows about company transformation using IT, changing customer relationship, improving productivity</td>
</tr>
<tr>
<td>IT Manager9</td>
<td>Unsure/ don’t know</td>
</tr>
</tbody>
</table>

Table 2: Survey response for each IT manager about knowing the business value of IT

So, only one of the nine (11,11%) IT managers that took part in the survey has responded that they know all four business values of IT. One of them (11,11%) know that customer relationship can be changed with IT which is one of the business values of IT. One of them (11,11%) has said that he knows about company transformation using IT, changing customer relationship with IT and improving productivity. Two of them (22,22%) believe IT can improve productivity, two of them (22,22%) know about two IT business values changing customer relationship and improving productivity. Two of them (22,22%) are not sure about the business value of IT.

The pie chart of this analysis has been shown below. There are six slices with basically two groups. One group consists of three equal sized slices (showing 11,11%) and another group consists of three equal sized slices (showing 22,22%). Among the slices that are showing 11,11%, the first slice with few black dots with white background is showing the IT manager who knows all the IT business value. In clockwise direction, the next slice is showing the IT manager who knows customer relationship can be changed with IT. Next slice shows the IT manager who knows about company transformation using IT, changing customer relationship
with IT and improving productivity. The slice after that shows the IT managers who know IT can improve productivity. Next two slices show the IT managers who know changing customer relationship and improving productivity and the IT managers who are unsure about the business value of IT.

Figure 7: Responses about knowing the business value of IT

We can conclude that among the IT professionals who participated in the survey, only one of them know about all the business values of IT (transformation of the firm using IT, changing customer relationship with IT, changing interactions with suppliers and improving productivity with IT). From the others response it is evident that they do not know about all the business values that were mentioned. Some of them know about only one business value, some knows two of them, some of them have no idea. It shows the difference in knowing the business value of IT among the professionals who are from different selected companies in Sweden.

4.1.4.1 Significance of the analysis

Significance of knowing all the business values will become clear from the example given by Brynjolfsson and Hitt (2000, p. 27). They show an example of a manufacturing company that made large investment in IT intensive production process. The company made a complete change in their in their production process with the help of IT. They totally changed their old style of working and brought a lot of changes with the help of IT. According to Brynjolfsson and Hitt (2000), few of the examples that the company aimed to transform with the help of IT are: all materials can be outsourced instead of raw materials made in-house, flexible job responsibilities rather narrow job functions, employees contribute in decision making by providing their ideas instead of few decision makers, few management layers instead of several layers, areas organized in work cell rather areas separated by machine type.

The above example proves the significance of one of the business values of IT which is company transformation using IT. Company transformation with the help of IT can be more understood with the concept of Business process Reengineering (BPR) that was explained by Davenport (1993). The concept of BPR is to redesign of the business process to get dramatic improvement in cost, quality, service and speed. Davenport (1993) shows process innovation
through information technology. Not knowing about the company transformation through IT means the chance of process innovation through IT is very less. From the survey, we can notice that only one professional (IT manager) says he knows about the use of IT in company transformation. In case of others, it might happen that due to the lack of awareness about the impact of IT in company transformation, they will not use it properly for the purpose of different types of company transformation that are described above in the previous paragraph rather they will just use IT in a usual way. Business process redesign with the help of IT will be helpful to gain extra benefit rather than working in the usual way. The company staff’s unawareness regarding the transformation of business with IT might also have a negative impact in the IT investment decision making of the company.

While mentioning about the fact of changing customer relationship with IT, Brynjolfsson and Hitt (2000, p. 30) give the example of Amazon.com’s online account maintenance system that provides its customers with secure access to their account. Brynjolsson and Hitt (2000) also refer to the international courier service UPS that allow customer to track their products via internet or over phone. As a result of which customers’ satisfaction is achieved.

From the survey response, it has been noticed that the awareness in the selected Swedish organizations about the fact that IT can change customer relationship is better than their knowing of other IT business values. Four out of eleven IT professionals said that they know that IT can contribute in changing relationship between the customer and the company. Those who have idea about utilizing IT for changing customer relationship, they can make profit as customer satisfaction means it ultimately benefit the company in one way or other. It is evident from the example of amazon.com or UPS. Those who are not aware of the fact that IT can function as a customer satisfaction tool, they will not use IT for customer satisfaction and completely ignore that particular utilization of IT. This may ultimately affect company’s business.

Brynjolfsson and Hitt (2000, p. 27-28) discussed few examples that show how IT can contribute in changing interactions with the suppliers. (Brynjolfsson & Hitt, 2000). Another example is Baxter healthcare group that introduced Baxter ASAP system that let the hospitals electronically order supplies directly from the wholesalers. It reduces cost of data entry (Brynjolsson & Hitt, 2000). Moreover the system had a cost saving of $10 million to $15 million for Baxter (Brynjolfsson & Hitt, 2000).

From the survey, we can see that only three persons responded that they know that IT can contribute in changing interactions with the suppliers. Among these respondents, 90% of respondents work in different types of manufacturing companies. If they do not know about the impact of IT in changing interactions with suppliers, they will not be able to reduce cost of the company as we discussed above from the example of Baxter ASAP.

IT contributes in improving productivity. Brynjolfsson and Hitt (2000, p. 30) explain a statistical analysis on several companies to look at the effect of IT investment and productivity increase. They drew the samples from 300 large firms and they found a significant impact of IT investment in the increase of productivity in financial terms.

In our survey, 5 out of 9 respondents (over 50%) answered that they know the impact of IT on productivity. That is good for those companies where these respondents are working with. But some of those 6 respondents did not say they know about other business value such as changing customer relationship with IT, company transformation, changing interactions with suppliers etc. Which means that few respondents are aware that they gain financial profit from IT but not aware about the other benefits such as changing customer relationship with IT, company transformation, changing interactions with suppliers. That means they will invest more on the IT systems that they think are profitable rather that ignoring the other business values which also can bring profit or reduce cost as we mentioned above.
<table>
<thead>
<tr>
<th>Business Value</th>
<th>Effect of knowing each of Business value of IT</th>
<th>Effect of not knowing each of the business value of IT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Transformation</td>
<td>Utilizing IT for Business process Reengineering (BPR) for improving performance such as cost, quality, service and speed. Using IT for getting all employees’ idea in decision making, using IT for outsourcing materials etc</td>
<td>Less possibility for BPR, employee participation in decision making might be less.</td>
</tr>
<tr>
<td>Changing customer Relationship</td>
<td>More customer satisfaction by providing extra service to the customers through IT</td>
<td>Less chance of using IT for providing extra service to the customers through IT</td>
</tr>
<tr>
<td>Changing Interactions with Supplier</td>
<td>New methods of IT will be introduces for cost reduction in supply chain process</td>
<td>Less chance of introduction of new IT systems for better supply chain process for cost reduction</td>
</tr>
<tr>
<td>Impact on productivity</td>
<td>Proper use of IT and proper investment on IT for more productivity</td>
<td>Ignorance for IT investment</td>
</tr>
</tbody>
</table>

Table 3: Summary of effects of knowing/not knowing IT business values

4.1.5 Responses on justification of IT infrastructure investment

The survey participants were asked about the justification of their investment on IT infrastructure. This question was also based on IT infrastructure investment by Ward and Peppard (2002, p. 554-559) that was discussed in literature review. Different responses have been gathered in this question. Out of those nine respondents, responses from only three IT managers (33.33%) cover all the five reasons (get more advantage from already successful IT systems, set up more efficient IT systems for reducing cost, enable growth in the volume of business transaction, bring changes in work practice, create a new business capability) for IT infrastructure investment. Two of them (22.22%) have said they invest on IT infrastructure to set up more efficient IT system, enable growth in the volume of business, create a new business capability. So, they cover three of the five justifications mentioned in the survey. One of them (11.11%) said that they invest to get more advantage, enable growth in the volume of business and create a new business capability. One of them (11.11%) has said they invest to enable growth in work practice and to create a new business capability. One (11.11%) has said they invest on IT infrastructure only to set up more efficient IT system.

The differences in the responses become clearer from the pie chart that has been shown below as it has six slices. The biggest slice represents the IT managers who have said that they invest on IT infrastructure for all five reasons. Significantly the slice is just one-third of the pie. The other slices are showing the IT managers with other different responses.
4.1.5.1 Significance of the analysis

The following comparison has been done by mapping the descriptions by Ward and Peppard (2002):

<table>
<thead>
<tr>
<th>Effects of following the reasons of IT infrastructure investment</th>
<th>Effects of not following the reasons of IT infrastructure investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT Infrastructure investment for key operational systems or already successful system will be helpful for its innovation and to maintain its high quality</td>
<td>Infrastructure investment without focusing on already successful system means no more innovation will be done on that to maintain its high quality and that might be no more a competitive advantage</td>
</tr>
<tr>
<td>An infrastructure investment to set up more efficient cost effective technology will be helpful to reduce the costs of current systems that may become obsolete</td>
<td>Investment without any focus to set up new efficient technology means there might be less cost saving with the use of current technology</td>
</tr>
<tr>
<td>Infrastructure investment to enable growth in volume of business transactions will be helpful to deal with the changes in business practices such as just-in-time delivery or to deal with increased business activity</td>
<td>Infrastructure investment without any focus on enabling growth in volume of business transactions will not help the organization to deal with the increased business activity</td>
</tr>
<tr>
<td>Infrastructure investment for changing the work practice can be effective in cost saving, knowledge sharing across organization, responding quickly and efficiently to changes in the market</td>
<td>Investment without aiming changing in work practice may be make organization unable to share knowledge across organization, respond quickly to changes in market</td>
</tr>
<tr>
<td>Infrastructure investment for creating a new business capability will be important for the organization’s future business strategy as the organization might need to move on from the current position to have competitive advantage</td>
<td>Investment without thinking of creating a new business capability will be a disadvantage for the organization for its future business position</td>
</tr>
</tbody>
</table>

Table 4: Effects of following and not following the reasons of IT infrastructure investment
4.1.6 Responses on Application Portfolio

The IT managers who participated in the survey was asked about application portfolio based IT investment, i.e., whether they have identified their key operation systems, strategic systems and support systems. Two of the nine (22.22%) survey participants responded that they have identified their key operational systems, support systems and strategic systems. Two of them (22.22%) have said that they have identified only the key operational systems. Three of them (33.33%) have said that they do not have the application portfolio. Two of them (22.22%) are unsure about the application portfolio. The responses are shown in the following pie chart where the biggest slice of the pie is showing the IT managers who have said that they do not have any application portfolio.

![Figure 9: Responses on Application portfolio](image)

4.1.6.1 Significance of the Analysis

From the above analysis the identification of different kind of IT systems is not done in most of the companies that are selected for this study. From Ward and Peppard (2002) we can see that investment based on the proper identification of key operational systems, support systems or strategic systems will ensure that the company should invest more money on the systems that are critical for its business success, i.e., the key operational systems or company should invest less money on the systems that are not critical for company’s business success, i.e., the support systems. So, not identifying different kind of systems means improper or random investment on different IT systems as the company does not know which IT system is important or which one is less important.

4.1.7 Responses on use of IT tools for operational visibility

The IT managers were asked about whether they use IT tools such as EAI or B2Bi for operational visibility as these may help for cost reduction. Six of the nine (66.66%) responded that they do not use these tools. Three of them (33.33%) have said that they use these tools. On the pie chart two slices of the pie are showing those two groups of IT managers.
4.1.7.1 Significance of the Analysis
From Vojdani (2003) we can say that use of integration tools like EAI or B2Bi will enable the company to have many facilities that include reducing IT interface development cost, interface maintenance costs, and application monitoring costs. So, as most of the companies participated in the survey do not use any IT tool, they may not be able to lower IT interface development cost, interface maintenance costs, and application monitoring costs.

4.1.8 Responses on Benefit Identification
The question regarding benefit identification prior investment was made after studying Benefit management process described in Ward and Peppard (2002) that is mentioned in literature review. The IT professionals of the selected companies were asked about the benefit identification prior IT investment. There is not much difference in their opinion as 7 out of 9 respondents have replied that they identify few benefits prior IT investment and no methods for benefit identification is used. So, 77.8% do not identify all benefits prior investment. Two respondents (22.22%) said that they identify all benefit prior making investment. The pie chart shows the responses:

Figure 10: Responses on the use of IT tools

Figure 11: Survey responses on benefit identification of IT investment
4.1.8.1 Significance of the analysis about Benefit Identification

As Ward and Peppard (2002, p. 439) describe in their Benefit management plan, one of the few questions that must be asked before any new IT investment is: what types of benefit is the organization expecting from the investment overall? Do they want to reduce costs or improve operational performance or gain new customers or create a new capability?

Ward and Peppard (2002) explain that identifying the target benefits needs an iterative process of establishing the investment objectives and the possible business performance improvements that the system and associated changes should or could deliver. The achievement of each objective could well deliver a variety of different benefits across the organization and also to trading partners and customers: customer service improvements in one area could produce new marketing or selling opportunities; productivity gains in administration may release resources for front-office activities. The process is inevitably iterative since objectives may be modified and new benefits identified as ideas and options are considered in the creative stage of discussion or may be rejected after more scrutiny.

Every business improvements are measurable so the target benefits from the new IT systems may also be measured, so it is essential that every target benefit should be measured although they can be subjective benefits such as customer or user satisfaction.

Finally, the determination of where in the business each benefit should occur and, for that, who in the organization should be responsible for its delivery. This is a logic often overlooked in bringing in new systems, but ‘ownership’ of each of the benefits and clear allocation of responsibility for delivery is essential to success (Ward and Peppard, 2002).

<table>
<thead>
<tr>
<th>Effects of identifying every benefit prior investment for new IT systems</th>
<th>Effects of not identifying every benefit prior investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearly establishing the investment objectives and finding out all the possible business performance improvements</td>
<td>Identifying few benefits without applying any benefit management plan means less clarity over the investment objectives and less investigation on possible business performance improvement</td>
</tr>
<tr>
<td>Identification of every benefit through benefit management process makes things clear in which part of the organization the benefit will occur and who is going to be benefited or who will deliver the benefit</td>
<td>Identifying few benefits in a random fashion doesn’t make things clear who is going to be benefited. The responsible person who will deliver the future benefits is not identified.</td>
</tr>
</tbody>
</table>

Table 5: Effects of identifying/not identifying every benefit of IT investment

4.1.9 Responses on evaluation and reviewing of the implemented new IT system

When asked about whether after implementation the new IT system, the benefit tracking is done with some method or not, most of the professionals said they do not review or evaluate whether benefits have been achieved or not from the newly implemented IT system. This question was also based on the benefit management process by Ward and Peppard (2002). Seven IT managers out of nine (77.78%) have answered that they do not review the benefit of newly implemented IT systems. Only one (11.11%) has said they do review the benefit of the IT system after implementation. One answered he is not sure/doesn’t know. On the pie chart, the biggest slice is showing the IT managers who has said they do not evaluate the newly implemented IT systems.

So, from the survey it is clear that among the selected organizations, most of them do not evaluate the benefit of the implemented IT system. Although most of them identify few benefits prior investment (from previous section) and they invest money but they do not evaluate or review.

The pie chart shows a really big slice that represents the IT managers who has said they do not review the benefits of newly implemented IT systems.
4.1.9.1 Significance of the Analysis

Ward and Peppard (2002, p.452) mention that once the implementation is done, a formal review must be done to check what benefits have been achieved and what have not. As mentioned in the literature review too, the reasons for this evaluation are (Ward and Peppard):

- To maximize the benefits of the particular investment
- To learn how to improve benefits delivery from the investment that will be made in future

The evaluation should involve all key stakeholders and what benefits have been or not yet been achieved should be found out. If any of the benefits have not been achieved, the reasons should be found out. Any evaluation process should be done for the future improvement (ward and Peppard, 2002). So, if we summarize the effects of evaluating or not evaluating IT implementation it will look like the following:

<table>
<thead>
<tr>
<th>Effects of Reviewing and Evaluating the implemented IT system</th>
<th>Effects of not reviewing and evaluating implemented IT system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear idea about what benefits have been achieved and what have not yet been achieved.</td>
<td>Less clarity over what benefits have been achieved and what have not been achieved.</td>
</tr>
<tr>
<td>Possibility of maximizing the benefits of a particular investment</td>
<td>No chance of maximizing the benefits if they are not notified.</td>
</tr>
<tr>
<td>Possibility of better benefit achievement from the future investment</td>
<td>Less possibility of better achievement for future investment as benefits from the past investment is not clearly reviewed</td>
</tr>
<tr>
<td>Clarity over how the implemented IT system benefited key stakeholder</td>
<td>Less clarity over the effect of new IT system on key stakeholder as there is no evaluation involving the stakeholders</td>
</tr>
</tbody>
</table>

Table 6: Effects of reviewing or not reviewing the implemented IT system
4.1.10 Responses on Challenges in Benefit Identification of IT investment

Survey respondents were asked about the difficulties or challenges they face while identifying the benefit of IT investment. Is it identifying the intangible benefits? Is it identifying benefits prior implementation or is it identifying benefits for stakeholders? Two of nine (22.22%) respondents mentioned that they find it challenging to identify benefits for stakeholders, identify benefits prior implementation and identify intangible benefits. One of them (11.11%) said that identifying benefits for stakeholders and identifying intangible benefits are challenging tasks. One responses (11.11%) that identifying benefits prior implementation and intangible benefits both are challenging. One (11.11%) has said that identifying benefits prior implementation is challenging. Four of them (44.44%) have responded that they are unsure about the challenges of benefit identification of IT investment. In the pie chart, the biggest slice represents those IT managers who are unsure about the challenges of benefit identification of IT investment.

Figure 13: Responses on Challenges of Benefit Identification
4.2 Analysis of Interviews: Finding out the reasons behind the current condition in IT financial issues

The author has found out the reasons behind answers of the survey respondents from the participating companies regarding various IT related financial issues. For that purpose interviews over telephone were conducted on four of those IT managers who took part in the survey.

4.2.1 Interview responses on the use of capital budgeting technique

Few respondents in the survey mention that they have no capital budgeting technique for IT investment or few of them mentioned that they are not sure about the use of capital budgeting technique for IT in their organizations. When it was asked to one survey respondent about the reasons of not using any budgeting technique he answered,

“There is no separate capital budgeting technique done for IT. Our main business is furniture and we do the budgeting as a whole including the budgeting for IT”

So, it can be said that the budgeting process for IT is not done separately as IT is not their main focus. They consider IT as one of the elements of their business and they do the return on investment measurement with their total budgeting.

Some companies are using payback period instead of using some better methods. The IT manager explained why his company uses payback period,

“The technique we are using is easily understood by us and use of new technique means starting new thing and we are not really thinking for this”

Another reply was,

“We tried some other technique in the past but that approach was not successful in estimating the return on investment”.

So, from the above comments we can say that the reason behind using payback period instead of using some other better technique is they are very comfortable working with it. So, they do not want to change. Another reason is, use of other techniques did not work for their cause.

One company is not using any of the convention capital budgeting technique (NPV, IRR, Payback etc). They have their own technique. The IT personnel explained,

“Within our company we have our own developed process for budgeting. And that is the same for all parts including IT. Compared to some other techniques our developed technique proved to be better”

From the above comments of the interviewees, we can say that the reasons behind choosing a particular budgeting technique are combination of satisfaction with the technique, failure after trying other technique, lack of intension for bringing change in the technique.
4.2.2 Interview responses on IS costs

When an interviewee was asked about whether they get any advantage by calculating the annual maintenance cost and implementation and ownership cost of hardware and software he replied,

“It is quite obvious as it gives very good idea about the total annual cost. We have a maintenance model and the goal is that all our systems should be maintained in the same way. The advantage is several: we get more aware of the true cost, it is also an indicator of how important the system is, we can compare different activities and systems and we also use it for planning purposes”.

From the above comment is clear that the reason behind calculating the annual maintenance cost and implementation & ownership cost are to have idea about the true cost of the systems and to use it for the planning purposes.

When one IT manager was asked about the reason of not calculating the indirect cost (the costs that are shared among multiple IT services) the reply was,

“We currently do not have exact information about the shared costs among the different IT services. Yes, it is important to know, maybe we shall do it in future”.

The above comment signifies that the company has a lack of knowledge about the shared costs of IT. So, it is not basically possible for them to calculate the cost.

4.2.3 Interview responses on IT resources

The IT managers of companies who said they have knowledge about the business impact of both IT infrastructure and Human-IT skill, were asked how important those resources are to their business. One of them said,

“The IT assets have some effects on our business so they are important but the contribution of the IT assets is sometimes hard to measure in financial terms. The IT experts are also contributing to the business but again it is not possible to measure exactly how much they contribute to the business success”.

An IT manager of other company said,

“Both IT infrastructure and IT skilled people are equally important to our business. We have got success because of the existence of both. However, not all the IT projects are done by the internal IT staffs. We often need help from the external consultants for better execution of the projects. So, the internal IT staffs are sometimes less vital than the external people during some projects”.

So, both the IT infrastructure and IT skilled people are important to the business but the quantification of their contribution is a problem. Moreover, companies tend to depend on external IT skilled people sometimes.

Most of the companies’ IT managers responded in the survey that they do not have knowledge about the effects of IT-enabled intangible resources in the business. When one of them was requested for an explanation he said,
“We are not exactly sure about the IT-enabled intangible resources in our business. As we are not sure about that resource so it is not easy to know about its impact on our business”.

Another interviewee’s reply on the same question was,

“In our business, customer service management has been done with IT. So, it can be mentioned as an intangible resource. But there may be some other IT-enables intangible resources about which we are not aware”.

It can be understood from the above comments that identifying the IT-enabled intangibles are difficult. Moreover, if few intangibles are identified the others remain unidentified the companies.

4.2.4 Interview responses on Business value of IT

The company that said they know that IT can transform the company, in the explanation they replied,

“With extensive use of IT we have transformed some of our operations successfully. Although in some areas IT could not really change that much but that is not because of the IT system, the reason may be due to lack of proper use of IT systems in those areas”.

So, there is evidence of transforming some business operations with the use of IT, although not all operations.

One company that responses that IT can change interaction with the customer while answering the survey question on business value of IT clarifies,

“The moment we initiated the IT system for getting feedback from the customers, we started doing things according to the customers’ needs. It is really useful to have interaction with the customer in the production business as it helps to identify what customer wants and then produce things according to that and IT really helped us to interact with the customers”.

The above comment indicates that IT really helps in interacting with the customers as it helps to identify the customer needs.

The IT manager of a company that ticked “Unsure” in the survey question about the business value of IT explained,

“The main problem with IT is its contribution is hard to measure in financial terms. We have manufacturing business and we are using IT to support our business. However, it is really difficult to say that IT is directly connected to improve our productivity or company transformation. Yes, it is somewhat connected to our company’s success but it is tough to measure”.

So, the reason for not being sure about the business value of IT is basically difficulty of measuring the contribution of IT with monetary figure.
4.2.5 Interview responses on IT infrastructure investment Justification
Different respondents in the survey showed different justifications about the IT infrastructure investment. One of them was asked in the follow-up interview about any particular reason for not investing to enable growth in the volume of business. He replied,

“The main reason for our IT infrastructure investment is to be one step ahead of the competitors. Can IT really grow the volume of business? It may. We have not really examined about it. That is why while investing on IT infrastructure we do not expect IT to grow our business. It is done for getting edge over the competitors”.

Confusion over the notion of growing volume of business with IT is one of the reasons for not investing on IT infrastructure with a target of growing the volume of business. The above comment supports that.

An explanation of a company that invests on IT infrastructure to set up more efficient IT systems is as follows,

“Our target for IT infrastructure investment is to have the most efficient IT systems of the market. Because we believe that whatever systems we are using right now can be replaced by more efficient IT system as it is not a good idea to continuously use the same IT systems year after year because in that case there is a possibility to fall behind the other companies in the use of latest IT systems”.

The above comment clarifies that tendency towards using the latest systems is a reason behind focusing on IT infrastructure investment for setting up more efficient systems.

An explanation of investing on IT infrastructure for creating a new business capability was as follows,

“We think IT as a way of making ourselves more effective in the market. Every existing IT system that we have in our company created a new effectiveness when we implemented them. That is why we expect to gain new efficiency while investing more on IT infrastructure. Every time we invest for IT infrastructure we want IT to make our business more capable”.

That means that the company believes that new IT systems can bring new effectiveness to their business.

The company that invests on IT infrastructure for getting more advantage from the existing IT systems explained,

“Investing more on existing successful IT systems is useful as that will ensure that those systems keep functioning properly to contribute to the success of our business. It is better to invest more on the successful existing systems rather starting something new”.

Above comment implies that less interest on investing for new systems and heavy reliability on the existing systems influence the decision of IT infrastructure investment on the existing systems.
4.2.6 Interview responses about the application portfolio

To get a deeper understanding about the application portfolio, some survey respondents were asked in the follow-up interview about the reason of not finding out the support systems as it might result in unnecessary investment on those systems. One of them responded,

“We know which IT systems are right now vital for our business success but not sure which systems are not critical for company’s success. But we have a feeling that all our systems are important for our business success and that is why we are not focusing on to find out the less important systems and make a differentiation in the investment process”.

Another replied,

“As far as support systems are concerned, it is not easy to find them out and it is tough to point out which IT systems are not critical for business success. Yes, there might be some systems that are not that important to our business success but we are not sure about those as I said earlier it is difficult to figure them out. So, the investment is made equally for all systems”.

According to another respondent,

“Recently we have found out special contribution of an IT system for our success, but that does not mean that the other systems are not important for our business success. The contribution can be more from some systems and less from some systems but all are important to the business. Moreover, some systems may be contributing in a way which might not be directly noticed. So, making less investment for some systems whose contribution to business is not directly identified, may be a bad idea”.

From the above comments we can analyze that the reasons behind not finding out the support system are:

1) Feeling of all systems are equally important
2) Lack of knowledge about which systems are support systems that means less critical for company’s success,
3) Support systems are difficult to identify.

4.2.7 Interview responses on use of IT tools

The IT manager of a company that does not use any IT tools for operational visibility said,

“We have not yet thought of using EAI or B2Bi for the purpose of operational visibility. We are using some simple method for information integration for getting operational visibility. The use of those tool is right now not important as operational visibility has been achieved through the method that we use”.

Another reply was,

“Lot of changes need to be done for successful use of EAI or B2Bi. In some companies, EAI use has failed due to the lack of required changes inside the organizations. So, it is a lot of tasks before implementing EAI or B2Bi. We are not thinking to make the required changes right no”.

So, it can be said that the reasons behind not having EAI or B2Bi for operational visibility are actually the use of some other technique instead of them and companies are not willing to make the changes required to introduce those tools.
4.2.8 Interview responses on Benefit management of IT investment

The IT managers of the companies that said in the survey that they identify few benefits prior IT investment but do not use any benefit identification plan for IT investment was requested to explain the survey response. One reply was,

“Anytime some benefits can be identified before new IT investment. Specially, we always have some targets to obtain from a new system. It is hard to identify all benefits before investment. It might be possible with some technique. Right now we don’t have any particular technique. We may use some benefit identification plan in future”.

Another IT manager explained,

“Benefit identification of IT investment has been done in an informal way. If someone finds out any good point about future IT investment, he discusses with others. Others also tell about their points of view about the benefit of the investment. Yes, a formal benefit identification plan for IT investment will be very valuable for the company”.

A staff of other company said,

“IT benefits are sometimes unpredictable. Few benefits can be guessed before investment or implementation. Previously we got some unexpected advantages after new IT system implementation. But it is possible to identify the benefits prior investment but in that case more time should be given for benefit identification. In our company, many IT investments were required to be done in quick time for some reason. That is why we do not have a formal benefit identification plan”.

Looking at all the above comments, it is understood that the reasons behind not identifying all the benefits are:

1) No use of proper method for benefit identification.
2) Benefit identification is done in an informal way.
3) Required time for identifying all benefits is not given.
5. Discussion

In this section the answers to research questions will be provided by discussing the results obtained from the analysis.

The first research question was:

**What are the current conditions regarding various IT financial issues such as IS costs, IT investment, IT resource, IT business value in the selected seven organizations in Sweden?**

To find out the answer to this question a survey was conducted among some IT service managers of some selected companies regarding several issues like use of capital budgeting technique for IT investment, IT cost calculation, the knowledge about the impact of IT resource on business, idea of IT business value, justification of IT investment.

**Capital Budgeting Technique for IT**

Laudon and Laudon (1996) describe various techniques for capital budgeting of IT investments such as, Payback period, ROI, NPV, IRR DCF etc. As far as the use of Capital Budgeting technique for IT investment is concerned, the seven companies that participated in the survey are not in a state that can be said good for IT investment as half of those participated companies either do not have any particular technique for capital budgeting for IT investment or the IT managers of those companies are not sure whether there is any capital budgeting technique used for IT investment or not. Some companies that took part in survey use payback period technique as their capital budgeting technique for IT investment.

From the literature review we can see that according to Laudon and Laudon (1996), the limitation of Payback period method is that it does not consider time value of money. They also mention that techniques such as NPV, IRR, DCF consider time value of value. Very few of those seven companies that participated in the survey use the techniques such as NPV, IRR, DCF that consider the time value of money.

**Calculation of various IS costs**

*Annual Maintenance cost of H/W & S/W and Implementation & Ownership cost*

The state of calculating annual maintenance cost and implementation & ownership cost is not dissatisfactory as more than half of those seven companies that participated in the survey said that they calculate both the annual maintenance cost and implementation & ownership cost. Few of them calculate only annual maintenance cost and few of them calculate only the implementation & ownership cost.

As seen from the literature review, Boddy *et al* (2005) state that both the costs mentioned above are often ignored by the companies. But from the findings we can see that most of the participating companies are in fact calculating those two costs.

*Variable cost, Labor cost, Indirect cost*

However, David *et al* (2002) mention about three more different types of costs related to IT service which are variable costs, labor costs and indirect costs and the condition with calculation of variable cost, labor cost and indirect cost is not that satisfactory. One-third of the companies that participated in the survey calculate all three costs. The rest of the two-third of the companies either calculate both labor cost and variable cost or calculate any one of the three costs.
Knowledge about the impact of IT resource on business
Bharadwaj (2000) mentions about the effect of three IT resources in the business. IT infrastructure, Human IT resource and IT enabled intangible resources. Among the participating companies of this study, the condition about the knowledge of the impact of IT resources is not satisfactory. Only two IT managers from two companies responded that they have knowledge about impact of all three IT resources. Two companies are unsure about the impact of IT resources in their business. One-third of the companies aware of the impact of only one IT resource (IT infrastructure) but not aware of the impact of other resources. It might effect their IT investment decisions as more investment may be done on the resource whose effect is well known to the company and less investment will be done to the resource whose effect is not known.

As Bharadwaj (2000) mentions, the companies that invest on IT without knowing how to combine of IT resources to have impact on the business will not get competitive advantage over other companies. From the findings of the seven participating companies we can see that most of the companies will have problems in getting competitive advantage as they do not know the effect of all IT resources in their business. As a result of which they will not be able to combine the IT resources to create IT capability and competitive advantage.

Business Value of IT
Brynjolfsson and Hitt (2000) mention about four business values of IT: company transformation using IT, changing customer relationship with IT, improving productivity with the use of IT and changing interactions with suppliers through IT. Among the companies that participated in the survey, the condition of knowing the business value of IT is not satisfactory. Only one IT manager of a company responded that he knows the all four business values that were mentioned in the survey. Two companies are not sure about the business values of IT. Few companies know one particular business value such as the relationship with the customers can be changed with IT. Few of them know about improving productivity with the use of IT. More or less, the knowledge of business value of IT is not clear to most of the companies that participated in the survey. Lack of knowledge about the business value might also result in IT investment decisions as less knowledge about the IT business value can be transformed into giving less priority to IT while making new investment.

After reading Brynjolfsson and Hitt (2000) it can be said that the participating companies who do not know about the fact that company can be transformed using IT will have less possibility for business process reengineering, less employee participation in decision making. From Brynjolfsson and Hitt (2000) it is also clear that the participating companies who do not have idea of changing customer relationship with IT will not be using IT for providing extra service to the customers. Moreover, the participating companies who do not know about the IT can change the process of interaction with the suppliers and improve productivity will have less chance of introducing new IT systems for better supply chain process for cost reduction and they may ignore more IT investment.

IT infrastructure investment justification
Ward and Peppard (2002) mention five reasons to justify IT infrastructure investment: to get more advantage from the already successful systems, set up more efficient IT systems, enable growth in the volume of business, bring changes in the work practice and create a new business capability. While investing on IT infrastructure, the seven companies that participated in the survey do not exactly invest on IT infrastructure because of the reasons five reasons. Half of the companies that took part in the survey, less than half of them mention that they invest because of those the five reasons. One company has mentioned that they invest on
IT to get more advantage from the existing IT systems, enable growth in the volume of business and create a new business capability. Some companies has mentioned that they invest on IT infrastructure to set up more efficient IT systems, enable growth in the volume of business and create a new business capability. One company has mentioned that they invest to set up more efficient IT systems and create a new business capability. One of them has mentioned that they invest just to set up more efficient IT system. Another one has said that they invest to enable growth in work practice and to create a new business capability.

So, most of the companies showed two or three reasons for IT infrastructure investment. From the literature of Ward and Peppard (2002), we can see that all the reasons are important to be considered while IT infrastructure investment. For the participating companies that do not consider some of the reasons might result in less investment for the innovation of the IT systems of the companies. Not doing investment with any focus of setting up new efficient IT system means there might be less cost saving with their current systems. The companies that participated in the survey which do not focus on enabling growth in the volume of business transactions will be in trouble to deal with the increased business activity. So, their IT systems might fail to cope with the increased business activities or fail to respond to the quick changes in the market.

**Application Portfolio**

Ward and Peppard (2002) mention about the key operational systems, support systems and strategic systems. As far as identifying the key operational systems, support systems or strategic systems is concerned, the companies that are targeted for this study are not in a good state. From the survey it has been found that only two companies have identified their key operational systems, support systems and strategic systems. Two company IT managers have responded that they identify only the key operational systems. Most significantly, more than half of the companies of the survey either do not have application portfolio or unsure about it.

From Ward and Peppard (2002) we can see that investment based on proper identification of key operational systems, support systems and strategic systems will ensure right investment on different IT systems. For the participating companies in this study, lack of identification of key operational systems or support system might result in wrong decision making in IT investment as there is possibility for investing more on support systems if the company is not sure about exactly which IT systems are support systems, i.e., the systems that are not that critical for their business success. They might not invest any more on key operational systems if they do not identify which systems are critical for their business success.

**IT tools for operational visibility**

Among the seven companies that are participant in this research, only three companies use IT tools such as EAI or B2Bi. The other four companies do not use these tools. As mentioned by Vojdani (2003), use of these tools provide different facilities such as reducing IT interface development cost, interface maintenance cost and application costs. So, the four companies that are not using these tools may be deprived of these facilities.

**Benefit Identification before IT investment**

Ward and Peppard (2002) describe about benefit identification plan before IT investment. Among the participating companies, benefit identification before IT investment is done mostly without any particular method in the seven companies that took part in this study. IT managers of only two companies responded that they have some method to identify all the benefits of an IT investment. Otherwise all the other companies responded that they identify few benefits before IT investment without using any proper method.
After mapping with the discussion from Ward and Peppard (2002), the participating companies that do not have any benefit identification plan will have less clarity over the investment objectives and there will be less investigation on possible business performance improvement. This means that few benefit identification will result in less clarity over the IT investment objectives. Random identification of benefit of IT investment do not make things clear who is going to be benefited that means the stakeholder of the benefits.

**Benefit tracking after system implementation**

Ward and Peppard (2002) also mention about the post-implementation benefit evaluation of the IT systems. Among seven companies that are in focus of this research, benefit tracking after system implementation is not done in any of the other five companies. Only one company does the benefit tracking. One IT manager of a company responded that they are unsure about it.

From Ward and Peppard (2002), it is clear that most of those companies will have less possibility of maximizing any benefit if it is not identified. There will be less clarity over what benefits have been achieved and what have not been achieved after the system implementation. There will be less possibility of better benefit achievement from future investment as benefits from the past investment is not clearly reviewed. If no study is done for the after effects of system implementation on the stakeholders, it will not be clear how the implemented system has benefited them.

**Challenges of Benefit identification of IT investment**

Ward and Peppard (2002) mention about three interesting things: identifying benefits for stakeholders, identifying benefits prior IT investment and identifying intangible benefits. Three important points about benefit identification have been asked to the survey respondents, difficulty in finding benefits for stakeholders, difficulty in identifying benefits prior implementation and identifying intangible benefits. One-third of the participant companies of the survey find it difficult to identify benefits for stakeholders, identify benefits prior implementation and identify intangible benefits. IT managers of two companies find it difficult either identifying benefits of the stakeholders and/or identifying intangible benefits. One-third of them are unsure about the challenges. So, most of the participant companies in the survey admitted that they face some kind of challenges while benefit identification of IT investment.
The second research question was:

**What are the reasons behind current conditions regarding various IT financial issues such as IS costs, IT investment, IT resource, IT business value in the selected seven organizations in Sweden?**

**The issue of Capital budgeting technique**
Among the seven companies that took part in this study, some of them do not have separate capital budgeting technique for IT investment because those companies are basically dealing in manufacturing business and the budgeting is done as a whole including the budgeting for IT. So, separate budgeting technique is not used for IT investment. Although payback period is not better capital budgeting technique than NPV or IRR, some of the organizations are using payback period because they feel comfortable using payback period as they understand it well and they do not want to introduce new technique as they do not want to make changes right now. Another reason of using payback period is because, the companies have been using the technique for several years and they are satisfied with the technique as in the past with the use of the technique they estimated the return on investment on IT more or less correctly. Few companies that use their own capital budgeting technique rather the conventional techniques have said in an explanation that in comparison with the conventional techniques their technique proved to be better.

**The issue of IS costs**
The companies that took part in this study, most of them calculate both annual maintenance costs and implementation & ownership costs and it is because they want to know the total annual cost of IT. One of those companies has a maintenance model and the goal is that all of their systems should be maintained in the same way so that they can know the true cost. One of the companies does not calculate the indirect cost because they currently do not have exact information about the costs that are shared among different IT services. Some companies do not know exactly how to calculate several costs related to an IT project. So, they cannot calculate the cost of an IT project.

**The issue of IT resources**
One of the participant companies of the study that responded in the survey that they know the impact of IT infrastructure and Human IT skills because according to them, both IT infrastructure and IT skilled people are important to their business because they got success as a result of the existence of both of them. But not all IT projects are done by internal IT staffs as they sometimes depend on external IT staffs. So, in some cases the internal IT skill is less important. About IT enabled intangible resources, most of the participant companies are not sure what the IT enabled intangibles are in their business. So, in the survey they responded that they are not sure about the impact of IT enabled intangibles in their business. The company that knows about some effects of IT infrastructure and IT experts but they also said that it is hard to measure the exact contribution of these two in their business. So, they are not sure about the impact of those in their business.

**The issue of Business value of IT**
The participant company in this study that is unsure about the business value of IT explains that the contribution of IT is hard to measure. They believe that IT is supporting their business but they cannot say with full assurance that IT is directly connected in improving productivity or company transformation. A participant company that believes IT can transform an organization because they have transformed some of their operations successfully with
extensive use of IT. Another company’s explanation for believing IT can be used for changing relationship with customers was because they used IT to identify customer needs and produce things according to their needs. According to another participant company, IT helps them for interacting with suppliers as they think without proper IT system in place, it would have been impossible to deal with the suppliers properly. So, they depend on IT for interacting with the suppliers.

**The issue of IT infrastructure investment**

One of the participant companies gave an explanation of not investing on IT infrastructure for the purpose of growing the volume of business. According to them, they do not expect IT to grow their volume of business. They invest for IT infrastructure to get edge over the competitors. So, they do not invest for IT infrastructure for growing the volume of their business. Another participant company explained their IT infrastructure investment for setting up more efficient systems. They mention that they invest on IT infrastructure investment for setting up more efficient systems because they do not want to keep using the same systems year after year as they may fall behind the other companies. Another company invests on IT infrastructure for creating new capability because every existing IT systems in their company created a new effectiveness after the systems were implemented. They want IT to make them more capable. The participant company that invests on IT infrastructure to get more advantage because they want to make sure that the existing systems keep functioning properly to contribute to the business success. It is better to invest on successful IT systems rather starting something new.

**The issue of application portfolio**

While explaining the reason behind not identifying the support systems, according to one participant company, they know which IT systems are right now vital for their business success but not sure about the systems are not critical for the company’s success. The company feels that all of their systems are vital for their business success and that is why they do want to focus to find out the less important systems and make differentiation in further investment on the systems. According to another participant company, it is not easy to find out the systems that are not critical to business success. So, the investments are made equally for all of them. Another view was, one system may provide extra advantage to the company but that does not mean that other systems are not critical for company’s success. So, investing more only on the system that is currently giving extra benefit will not be a good idea.

**The issue of the use of IT tools**

Some participating companies of this study are using simple method for information integration for the operational visibility because the operational visibility is achieved through their existing methods. Another explanation by other participant company was, lot of changes are required for the successful use of EAI or B2Bi. As some companies failed to use EAI because of not making the changes, it is not good idea to start EAI before making the changes. The changes are not going to be done now.

**The issue of Benefit management of IT investment**

According to one of the participant companies in the survey, they identify few benefits of IT investment as they do not have any particular technique for identifying all the benefits of IT investment. They think it is hard to identify all benefits prior investment. Another company does benefit identification of IT investment in an informal way. That is why they do not identify all the benefits before identification. They think that a formal technique will be useful. Another view was, IT benefits are sometimes unpredictable as the company got some
unexpected benefits from an implemented IT system. It may be possible to identify all benefits prior investment but it requires extra time but some IT investments are done in quick time for some internal reasons.
6. Conclusion

Two questions were raised at the start of this research in an attempt to investigate the condition of various financial issues related to IT in the seven organizations that are selected for this research and to find out the reasons behind the condition. In order to answer the first question which was about finding out the conditions of various financial issues related to IT such as IT investment, IT costs, IT resources, IT business value in the selected seven organizations, a discussion was done with the help of the previous studies done on those issues. Then a survey was conducted among the IT managers of those selected seven companies to answer several close ended questions. The survey was done on following areas, use of capital budgeting technique, IT cost calculation, knowledge about the IT business value, knowledge about the impact of IT resource, use of application portfolio etc. The result of the survey gives the impression that in most of those seven companies’ IT investments are not properly done and the companies are not that much aware of the impact of IT resources on business or the business value of IT.

To get a better understanding of the condition, four IT managers were requested for interviews who were among the survey respondents. That was important to get answer to the second research question. When asked about the reasons for the conditions related to various financial issues of IT that they responded in the survey, few things become clear. Firstly, most of these companies that took part in this study are not willing to make changes. Then some companies are happy with the way things are going now as they have not yet faced that many problems related to IT investment. Another thing was, they have faced some difficulties to find out the impact of some IT resource in their business or to understand each and every business values of IT. So, basically the reasons for the conditions in various financial issues related to IT in those selected seven organizations are: unwillingness to change, satisfaction with the present state of IT financial management and lack of knowledge in some issues or difficulties to understand few issues.

6.1 Validity & Reliability of the Results

The results of this research have been achieved through proper interactions with the participant IT managers of different companies. First of all, it was decided that only the professionals who deal with the financial issues of IT were going to participate in the survey. So, the selection of the survey participants was done in a way that only those IT managers were selected who deal with the IT financial issues that have been discussed here. They deal with those issues in a regular basis. Before sending the survey questionnaire, they were asked by emails whether they are interested to participate in the survey or not. Survey questionnaire were sent to only those who showed interest in answering the survey. So, it works in the favor of proving the validity and reliability of the survey results.

The interviews were planned to be conducted with all nine IT managers who participated in the survey. But some of them became extremely busy with their professional activities and could not provide time for the follow up interview. Four of them managed some time for the interview and they replied the answers with care and interest. These four IT managers explained their responses in the survey and that validates the results that have been achieved from the interview.
6.2 Contributions to the Field of Information Systems

The answer to the second research question of this research will be helpful for the information systems researcher to understand the reasons that can have influence an organization’s IT investment decision making or IT cost calculation. According to Avison and Shah (1997, p. 98), IT investment decision making and IT related various cost calculations are important tasks of feasibility study stage of information systems development. Feasibility study is the first stage of information systems development life cycle whereas the other stages are systems investigation, systems analysis, systems design, implementation, review & maintenance (Avison & Shah, 1997, p. 71). So, the current study in fact looks at the feasibility study stage of the information systems development process and the reasons that can have influence on that stage. The reasons that are found here behind the use of capital budgeting technique for IT investment, IT cost calculation in the participating seven organizations can be tested for other organizations of other countries while investigating their condition of IT investment decision making and IT cost calculation.

Moreover, Silk (1990) mentions that justifying the IS/IT investment is among the major issues of information management. So, another contribution of this research is, it focuses on how the participating companies justify their IT investments. From the literature review, the author has found five reasons of IT infrastructure investment and asked the participating companies about their reasons for IT infrastructure investment. The findings can be helpful for the academics to understand the various probable reasons for the companies to invest on IT. Although the current research has been done on seven companies, the findings will contribute to the field of information management by providing a preliminary understanding for the justification of IT investment by the organizations.

Avison and Fitzgerald (2002, p. 53) refers that IT investment is an important part of information systems strategy making. The current research shows various reasons that affect the use of capital budgeting technique for IT investment, benefit management of IT investment, knowledge of impact of IT resource. As IT investment is a part of information systems strategy making, the current findings helps the academics to understand the reasons that might affect the information systems strategy making process in an organization.

As far as practical implication of this research is concerned, the seven companies that have taken part in this study will be able to judge their present condition from the survey analysis done in this study. In the survey analysis part, the responses from the company staffs have been mapped with the findings from the literature review. That might be helpful for the seven participating companies to take decisions about their future steps while dealing with the financial issues that have been discussed in this study.

6.3. Future Research

This research has been done on a small number of organizations. Seven organizations have participated in this research. To get a broader view, it will be great if the same investigation can be done on a large number of companies in Sweden. That will be helpful to have a general idea about the condition in various IT financial issues in the organizations in Sweden.
7. References


Milis, K., Snoeck, M., Haesen, R. (2009), Evaluation of the applicability of investment appraisal techniques for assessing the business value of IS services, FBE Research Report, Research Center for Management Informatics (LIRIS), Katholieke Universiteit Leuven, Belgium, pages 1-19


8. Appendix

Survey Questionnaire

1. Our budgeting process for IT services include the following method (s):
   - [ ] Payback period method
   - [ ] The accounting Rate of Return on Investment (ROI)
   - [ ] Net Present Value
   - [ ] Internal Rate of Return
   - [ ] Cost benefit ratio
   - [ ] Discounted Cash Flow
   - [ ] Some other techniques
   - [ ] We do not have any forecasting technique
   - [ ] Unsure/Don't Know

2. While reviewing the IT services, we are considering following type of costs:
   - [ ] Annual maintenance cost of H/W and S/W
   - [ ] Implementation & ownership costs
   - [ ] We do not calculate the above mentioned costs
   - [ ] Unsure/Don't Know

3. When calculating the IT-service cost we follow up the following cost types:
   - [ ] Labour costs of personnel
   - [ ] Indirect costs (costs shared among multiple IT services)
   - [ ] Variable costs (licences, resources etc)
   - [ ] None of the above
   - [ ] Unsure/Don't Know
4. We have knowledge about the effect of the following IT resources

☐ IT infrastructure
☐ Human IT resources
☐ Intangible IT-enabled resources
☐ unsure/don't know

5. The reasons we invest on IT infrastructure are to:

☐ get more advantage from the already successful IT systems
☐ set up more efficient IT systems for reducing cost
☐ enable growth in the volume of business transaction
☐ bring changes in work practice
☐ create a new business capability
☐ Unsure/Don't Know

6. We are using IT tools (EAI, B2Bi) that provides us with total service visibility:

☐ Yes
☐ No
☐ Unsure/Don't Know

7. We know the following business value of Information technology

☐ Company transformation using IT
☐ Changing customer relationship with IT
☐ Improving productivity
☐ Changing interactions with suppliers
☐ Unsure/don't know
8. We use Application Portfolio to identify following type of systems for future IT investment:

- Key operational systems
- Strategic systems
- Support systems
- No application portfolio
- Unsure/Don't Know

9. When investing on new IT system we:

- identify few benefits of the new system, no special techniques are used for benefit identification
- identify all benefits with benefit management plan
- Unsure/Don't Know

10. We evaluate and review the benefits of an IT system when it is implemented:

- Yes
- No
- Unsure/Don't Know

11. While identifying or measuring the benefits of IT investment, we face the following challenges:

- Benefits for stakeholders
- Identifying benefits prior implementation
- Identifying the intangible benefits
- Unsure/Don't Know
Interview Questions
(This is complete set of interview questions. Not all questions were asked to each interviewee. Question was asked according to their response in the survey)

1. Could you please tell the reason for not using any capital budgeting technique for IT investment?
2. Is there any particular reason for using the capital budgeting technique that is being employed in your organization now?
3. Could you please explain the reason to calculate both annual maintenance cost and implementation & ownership cost?
4. Could you please explain the reason for not calculating indirect costs?
5. Why are you unsure about the business value of IT?
6. Is there any reason for having idea about (name of a business value of IT)?
7. How important is IT infrastructure, Human IT skill to your business?
8. Is there any particular reason that you are not sure about the impact of IT enabled intangibles in your business?
9. Could you explain the reason for not identifying the support systems?
10. What is the reason that you do not invest on IT infrastructure for growing the volume of business? (was asked in a different way to other respondent depending on their reply in survey)
11. Why do not you use EAI, B2Bi for operational visibility?
12. What are the reasons for not using any technique for benefit identification before IT investment?