



Addis Ababa University  
College of Business and Economics

Assessment of Capital Budgeting Decisions on  
Information System Investments; Evidence from  
Ethiopian Banks

By Mikiyas Getachew

A Thesis Submitted In Partial Fulfillment of a Master of Science Degree in  
Accounting and Finance

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A THESIS SUBMITTED TO ADDIS ABABA UNIVERSITY  
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**ADDIS ABABA UNIVERSITY  
COLLEGE OF BUSINESS AND ECONOMICS  
DEPARTMENT OF ACCOUNTING AND FINANCE**

**CERTIFICATION**

This is to certify that the thesis prepared by Mikiyas Getachew, entitled: *Assessment Of Capital Budgeting Decisions On Information System Investments; Evidence From Ethiopian banks* and submitted in partial fulfillment of the requirements for the degree of Master of Science in Accounting and Finance complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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## DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of Ato Gebremedhin Gebrehiwot. All source materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

Mikiyas Getachew

Name

\_\_\_\_\_  
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**Addis Ababa University, 2016**

## ENDORSEMENT

This thesis has been submitted to Addis Ababa University, college of Business and Economics for examination with my approval as a university advisor.

Gebremedhin Gebrehiwot

Advisor

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Signature

**Addis Ababa University, 2016**

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## ACRONYMS\ABBREVIATIONS

<b>ARR</b>	Accounting Rate Of Return
<b>BDA</b>	Business Domain Assessment
<b>CBA</b>	Cost Benefit Analysis
<b>CSF</b>	Critical Success Factors
<b>DCF</b>	Discounted Cash Flows
<b>DSS</b>	Decision- Support Systems
<b>ECSS</b>	Electronic Communications Systems
<b>EROI</b>	Enhanced Return on Investment Calculation
<b>ESS</b>	Executive Support Systems
<b>IRR</b>	Internal Rate of Return
<b>IS</b>	Information System
<b>IST</b>	Information System Technologies
<b>IT</b>	Information Technology
<b>KBIS</b>	Knowledge-Based Information Systems
<b>MIS</b>	Management Information Systems
<b>NPV</b>	Net Present Value
<b>OAS</b>	Office Automation System
<b>PBP</b>	Payback Period
<b>PI</b>	Profitability Index
<b>R&amp;D</b>	Research And Development
<b>ROI</b>	Return On Investment
<b>TDA</b>	Technical Domain Assessment
<b>TPS</b>	Transaction Processing Systems

## ABSTRACT

Preliminary surveys and literatures on information system investments suggests a high increase on the level of investment, while there appears to be a lack of concrete empirical research on the area. In an attempt to explore the extent of this presumption, this research investigates the current state of IS investment and its process within Ethiopian banking institutions. Several theories and empirical outcomes were proposed to explain the investment pattern, appraisal techniques and post investment perception of IS adopters by the study subjects. To this end, the results of the study showed that information system investments are justified by information system heads, with the investment pattern focusing mainly on transaction processing systems (100%), management information systems (95%) and communication systems (63%). Furthermore, the study revealed the wide application of simple strategic investment appraisal methods, while the level of usage of discounted cash flow techniques and sophisticated analytical and integrated techniques being low. To illustrate, Strategic techniques were found to be very popular with Technical importance and SWOT analysis being used 100% and competitive advantage and critical success factor being used by 95% of the responding banks. Adding to this findings, the study showed the degree of perception investors have on the relative advantage brought by the system and the compatibility of the system with the organizations setting, in doing so the respondents showed a positive perception that was revealed with a mean value of 4.86 and 4.43, respectively: on a 1 to 5 scale where higher value represents higher agreement. Based on this findings, recommendations were made for a divers composition of professionals and appraisal techniques on IS investment justification process.

***Key Words: Information System, Information Technology, Investment Appraisal Techniques***



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## CHAPTER ONE-INTRODUCTION

### 1.1. Background of the Study

A firm's growth, including its ability to remain competitive, depends on a constant flow of; ideas for new products, improvements in existing products, and ways to operate more efficiently (Ehrhardt & Brigham, 2009). This statement is ever justified by looking at the fall of some of the most successful corporation in the US, which were thought to be technologically advanced at one point in time. In a November, 2016 article, the Forbes magazine<sup>1</sup> discussed the case of companies too big to fail at a point in time such as; Kodak and Blockbuster, are destroyed due to the lack of appetite for changes.

As a result of such far reaching consequences of the dynamic business world, practitioners and academicians have put forward a series of approaches which are intended to help business cope with the changing environment and achieve efficiency altogether. Among such present-day recommendations, investment on information technologies is a major one. This recommendations are made based on the perception that IS\IT has a paramount advantage in a firm's competitiveness and productivity. More specifically the advantages are claimed to be demonstrated, either through increasing revenues at marginal cost, or through reducing costs at marginal changes in revenue, with both enhancing operating profits (Mashhour & Zaatreh, 2008).

As a result of this perceived advantage of information system technologies businesses globally have proven to be the major driving force behind the explosion of information technology innovations during the 1990's and onwards. According to (Lovelock, 2013) it is estimated that information technology spending in the United States alone reached 3.7 and 3.8 trillion, for the years 2014 and 2015 respectively. Following this pattern, developing nations focusing on adoption of modern manufacturing and business practices, have joined the demand of information technologies.

As part of the developing nations, business in Ethiopia have invested a great deal of capital on information systems technologies. A notable example in this regard is the banking industry. The

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<sup>1</sup> See <http://www.forbes.com/sites/joshlinkner/2012/11/16/palm-kodak-blockbuster-sears-rim-borders-circuit-city-compaq-and-the-only-thing-you-can-do-to-avoid-being-next/#5d745784f127>

industry, due to the level of attention given to the sector and its resulting dominance in the economy holds the lion's share of such investments. (Dagne, 2010) showed that private banks in Ethiopia have invested 20 to 90 million on information system technologies between the years 2005 and 2010, growing from 4% to 9% of their total asset.

As a result of this, there arises a question on measuring the benefit of information system in an organization. To this end, despite the extensive development of finance literature on capital investments, generic and universal tools for evaluation of investments on information technologies appears to be an exception. (Brynjolfsson, 1991), while testing the famous concept of 'Productivity Paradox', states that;

*“The relationship between information technology (IT) and productivity is widely discussed, yet little is understood. Delivered computing power in the US economy has increased by more than two orders of magnitude since 1970 yet productivity, especially in the service sector, seems to have stagnated”.*

The above statement by (Brynjolfsson, 1991) clearly summarizes the prevailing condition of IT and the success of its corresponding evaluation tools. As a result, it has been the interest of academicians and practitioners alike to develop a concrete process of evaluating investments on information technologies. To this effect, scholars in both finance and IS professions have provided a number of assessment techniques focusing in different aspects of the subject matter. Finance literature focused on studies such as: the relationship between the theoretically suggested assessment techniques and the actual assessment techniques employed by practitioners in making investment appraisals on IS/IT, such studies include (Ashford, et al., 1988; Ballantine & Stray, 1999; Brynjolfsson, 1991; Gitman & Forrester, 1977; Irani & Love, 2008; Grembergen, 2001; Shinoda, 2010). In addition, the relationship between investment amounts, firm size and IT capital was also another area of focus, (Hamilton & Anderson, 2003; Stone, 1990; Dagne, 2010; Khakasa, 2009). One major dispute in this regard is the case of economic appraisal approaches, suggested in finance literature and strategic and integrated approaches advocated in information system literatures.

IS literatures argued that, as a result of purely economic approaches to apprise IS investments, there is an emerging widespread and growing concern in organizations that IS investment does not deliver value and that many segments do not meet business objectives (Fitzgerald, 1998). As a

result, information system scholars propose that, the priority appraisal approaches should be strategic and integrated methods rather than pure economic techniques. In this argument, it is important to note (Brynjolfsson, 1991), who states that; *'we must be careful not to over interpret these findings (productivity Paradox) which are only a shortfall of evidence and not necessarily evidence of a shortfall'*.

Capitalizing on this context, this study in line with past empirical studies and other concerned literatures, assessed information system investments made by Ethiopian commercial banks along with their corresponding evaluation approaches. In doing so, the study takes in to consideration a multitude of capital budgeting approaches available; singular and framework based evaluation approaches, and provides an assessment on the investments process.

## **1.2. Statement of the Problem**

In recent years, information systems and corresponding investments on information system technologies has been given paramount attention by business in Ethiopia. In this regard, being a leader in the national GDP contribution (NBE, 2014), the service sector in general and the banking industry in specific is notable. Affirming this fact (Locher, et al., 2004) suggested that; information technology and information systems play an important role in banking business. Development, production and distribution of banking services are not feasible without the permanent use of IT.

Consequently, (Barua, et al., 1995) suggested that, such investments pass-through a specific set of capital budgeting process. Out of this, the process of evaluating potential IS investments is central, as there is a need to seek concrete evidence on the expected contribution each investment will have to the firm. However, one of the biggest problems managers face when attempting to make effective IS investments decision is, their inability to predict and measure the benefits that results from the investment (Irani, et al., 1997). This is due to the fact that; IS investments are uncertain, interdependent and irreversible (Bardhan, et al., 2004), resembling capital investments in R&D which have corporate-wide, intangible and long lasting effects (Bandyopadhyay, et al., 1999).

To alleviate this, finance literatures (Pike & Neale, 2006; Shapiro, 2004; Irani, et al., 1997; Ballantine & Stray, 1999; Ashford, et al., 1988) recommended that, all projects be subjected to formal analysis. More specifically, (Ashford, et al., 1988) states that IS investment as a standard investment undertaking should follow capital budgeting appraisal techniques. However, studies in



the area such as (Gitman & Forrester, 1977), suggests that in practice, these procedures may be violated. In addition, IS literatures (Brown, et al., 2010; Bardhan, et al., 2004) suggests that financial\economic techniques are considered "traditional", and are not widely used to evaluate potential IS investments. This suggests a gap between what scholars and practitioners consider as acceptable and realistic IS investment appraisal technique.

Partly owing up to the above facts, past studies showed that the use of capital budgeting practice of Ethiopian banks remains at a relative infancy stage. (Dagne, 2010) showed the small usage of appraisal methods for IS investments, attributing it to the lack of experience and the rapid boom in the industry. Moreover, studies in the area remains very low; (Dagne, 2010) studied the capital budgeting practice of six private banks on information technology investments and the relationship between their IT capital with that of the firm's corporate value. Though the study had contributed to the subject matter, it failed to show what actual evaluation process the banks followed in relation to both economic and strategic evaluation approaches, stating that no appraisal mechanism has been followed. In addition, the study only considered economic appraisal approaches and disregards the multitude of approaches available in the literatures. In addition, the study considered IS investments made on the period pre 2010, a period regarded<sup>2</sup> as low IS investment period when compared to the subsequent five years, where the banking industry has made enormous investments in the area. Other studies made by (Nigussie, 2015) considered the impact of IS on banks performance, and tried to identify the challenges faced whereas (Kubie, 2010) tried to show efficiency of service delivery through information system. Despite their daring contribution for the area, both studies left out the investment process along with any investment justification process made by the firms.

Therefore, this study in contrary to previous studies summarized above, will specifically focus on the assessment of capital budgeting appraisal procedures employed for information system investments, theoretical and empirical works available in the area were reviewed and employed to enable the assessment process a more balanced outlook. With this, it was attempted to address the gap not yet filled by previous studies, and further investigates the issues which were considered shallowly.

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<sup>2</sup> Based on preliminary interviews, banks had made large scale IS investments post 2010 period (i.e. Core Banking and ERP systems acquisitions)

### **1.3. Research Questions**

This study, based on the preceding problem statement, answers the following research questions.

1. What type of information technology investments, based on purpose, are made by the Ethiopian commercial banks?
2. Does a theory-practice gap exist on information system investment evaluation approaches adopted by Ethiopian Banks?
3. Which role, within the Ethiopian banks, is responsible for the evaluation of information system investments?
4. What are the level of perceptions IS investors have on the success of their IS investments?

### **1.4. Objectives of the Study**

#### **1.4.1. General Objective**

The general objective of this study was to assess the information system investment process and the corresponding perception of Ethiopian commercial banks on their investments.

#### **1.4.2. Specific Objectives**

- To identify the type of information system investment made by Ethiopian commercial banks.
- To identify the appraisal methods adopted when investing on the information technologies.
- To identify the specific authority that is responsible for the justification of Information system investment.
- To assess the level of perception Investment makers have on the success of the IS investments.

### **1.5. Significance of the Study**

The study's basic significance lies in its contribution to the shortage of empirical research in the area of information system investments in Ethiopia. In doing so, the study provided a practical benchmark reference on IT investment patterns, by showing the investment focused of banks included in the study. In addition, it provides effective theoretical and practical approaches in

which information systems are being appraised, there by leading to the proper appreciation of such systems. With this, the study enables stakeholders such as; banking organizations, hardware and software providers and technology consulting firms to gain; industry insight, investment patterns and efficient ways of conveying such products to the market.

Moreover, the finding of the study will have paramount importance to policy makers, planners, vendors and banks to draw lessons on the issues under consideration. This is achieved by: exposing the prevalent type and process of IS investment for policy makers and planners; showing the information system technologies that are demanded in the industry and those that are lacking; revealing the capital budgeting process deficiencies for banks and similar decision makers. Finally, this study will serve as an input and foundation for further works who would like to undertake research on related area of study.

#### **1.6. Scope and limitation of the Study**

The study is framed to assess information system investments made by Ethiopian banks. In doing so, due to the lack of other type of banking business in the industry only commercial banks are considered in the study. Furthermore, the study focuses on both; the assessment of information system investments and the process of investment followed for the different types of information technologies in the bank's portfolio.

Some limitations concern the data collection method; where findings could have been influenced by the data collection method. Firms were asked to submit information consistent with the definitions that were specified in the questionnaire, as a result respondents may have understood the definitions of the techniques differently. To minimize the impact of this limitations, respondents were asked to fill the questioners with the presence of the study author and when not possible clarification and follow-up were made on the methods.

#### **1.7. Organization of the Paper**

The study is arranged in to five chapters, the first chapter introduces the paper by outlining the study background, the problem statement, the study objectives, and the scopes and limitations of the study. Whereas, the second chapter contains the detailed theoretical and empirical literature reviews made on the study area. The third chapter contains the methodology of the study, where the study design, the target population, data collection and analysis methods were described in

detail. The fourth chapter is dedicated to the presentation of the study result along with the corresponding interpretation and analysis. The fifth chapter of the study provided conclusions and recommendations that were made based on the result of the survey. Finally, the study will contain two peripheral sections, bibliography section, which is arranged in the Harvard style, and annex section which contains relevant documents and data, used and referred in the study.

## CHAPTER TWO-LITRATURE REVIEW

### 2.1 Review of Theoretical Literature

#### 2.1.1 Capital Budgeting-Basic concepts

Different Scholars<sup>3</sup> recognize capital budgeting from two important outlooks; functional and objective based outlooks. Functional scholars tried to engage the concept as an investment analysis tool, by focusing on its process. Whereas, the objective based scholars tried to show the purpose of the concept, from the agency theory and goal of the business (firm) point of view.

From the functional perspective, (Gervais, 2009) defined capital budgeting as; *“the process by which firms determine how to invest their capital, included in this process are the decisions to invest in new projects, reassess the amount of capital already invested in existing projects, allocate and ration capital across divisions, and acquire other firms.”* In the same manner, (Ehrhardt & Brigham, 2009), defined capital budgeting by taking each element of the concept; *capital* refers to long term assets used in production, and a *budget* is a plan that outlines projected expenditures during a future period. Thus, the *“capital budget is planned investments of assets that will last for more than a year, and capital budgeting is the whole process of analyzing projects and deciding which ones to accept”*.

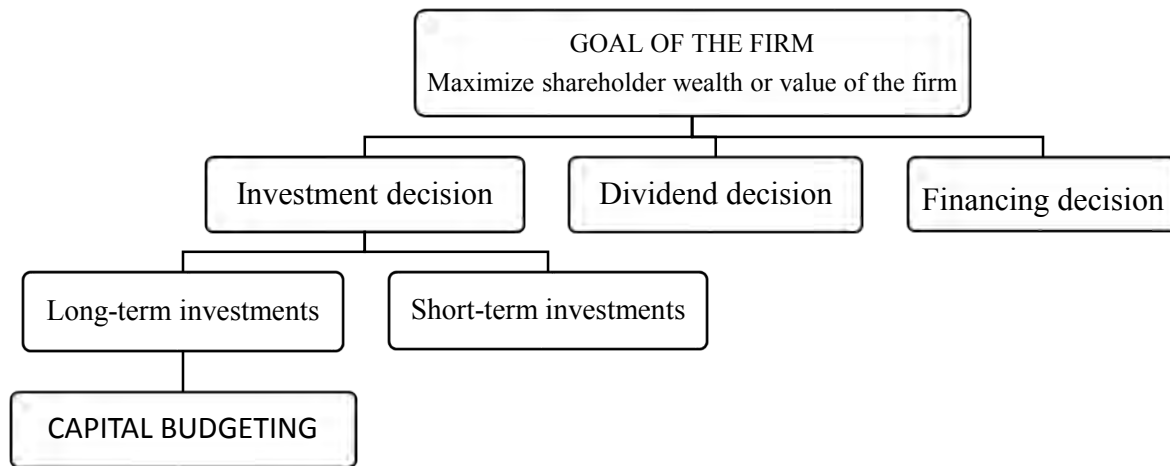
On the other hand, (Dayananda, et al., 2002)from the objective based definitions stated that: *“capital budgeting is assumed that the objective of the investment or capital budgeting decision is to maximize the market value of the firm to its shareholders”*. Furthermore, (Brown, et al., 2010) strengthen the same by defining the concept as, *“the process of evaluating comparing and selecting capital projects to achieve the best return on investment over time”*. In both of the above objective based definitions, the authors showed that, despite the fact that the responsibility of conducting the capital budgeting process being the management’s, it is conducted with the aim of ascertaining that it is done in the best interest of the owners (shareholders).

The below figure is designed to show this relationship of the process and its objective;

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<sup>3</sup>See (Simon Gravis (2009), Michael C. & Eugene F. (2011, p. 381) and Dayananda, Irons, Harrison, Herbohn and Patrick (2002), Brown, McEvoy, Nagel & Rascher (2010)....

Figure 1-Corporate goal, financial management and capital budgeting



Source; *Adopted from* (Brown, et al., 2010)

Therefore, taking the above two perspective definitions, a more balanced definition can be derived as; capital budgeting is the process of evaluating, comparing, selecting and allocating/rationing funds to capital projects with the aim of maximizing the market value of the firm to its shareholders.

In this regards, (Irani & Love, 2002) considered why firms use the capital budgeting process when making such decision. In doing so they used the following items as a justification; (1) Comparison between different projects, the firms use them to compare the different potential project at hand; (2) Rank projects in terms of organizational priorities, here capital rationing is made in accordance with strategic objectives (3) Justify investment requests by management, here the management uses the process to show owners the value gained through such investments (4) Control expenditure, benefits, risk, development and implementation of projects, (5) Provide a framework that facilitates organizational learning; and (6) Mechanism to decide whether to fund, postpone or reject investment requests.

### **2.1.2 The Capital Budgeting As a Process**

Capital budgeting has an essence that establishes its process. (Pike & Neale, 2006) state that, instead of the overall capital budgeting process, too much emphasis has been given to capital investment appraisal methods in much of capital budgeting literature. In this regard, they suggest

that such emphasis is misplaced and the capital budgeting decision could be improved if the focus is placed on strategic questions, rather than the complexity of the appraisal method adopted.

Accordingly (Pike & Neale, 2006), despite the top management having the final say, the decision making is made by managers at the lower level by a process that is not clear and uniform at all companies. Therefore, they provide what they consider “key stages in capital budgeting”, that will enable the firm to finance, and analyze projects optimally. These key stages are;

- I. Determination of the budget.
- II. Search for, and development of, projects.
- III. Evaluation and authorization.
- IV. Monitoring and control.

The key stages are explained by (Pike & Neale, 2006) as: *Determination of the budget* is a stage that answers the question of, how much is available to spend. Whereas *Search and development of project* stage answers, what project ideas have emerged? (Search), what costs and benefits will they generate? (Screening), what type of project? (Definition). After that the *evaluation* stage answers, what is the value of the projected costs and benefits? What is the target rate of return? Does the project’s IRR exceed this target? (Or does it have a positive NPV?) And how risky is the project?

Once this stages are concluded and the project is authorized, the *monitoring and control* stage kicks in, this stage has the task of assessing whether the project is on schedule; during implementation it checks whether costs will exceed the budget; and on ongoing basis, checks whether the project is performing to budget? Finally Post-auditing is made, this is to asses if the project is performing to initial expectations? And what lessons can we draw to assist future appraisals?

While, (Pike & Neale, 2006) place their suggestion in the above manner, (Dayananda, et al., 2002) describe the capital budgeting process by relating the process with the strategic objective of the firm.

(Dayananda, et al., 2002) state that, capital budgeting is a process that carry multi-faceted sequential stages that start in strategic planning and continues up to post implementation audit. In this process, they state that each stages comes in a sequential process that feeds in to the subsequent

stage in a process that circles back to the initial strategic planning process as a feedback. They have demonstrated their theory in a process chart which is combined and presented here.

To provide a well-adjusted view of the considerations of (Pike & Neale, 2006) and (Dayananda, et al., 2002) the following summary is provided by grouping the process in to 5 stages;

- I. Both see the first stage of the process emanating from the (1) *corporate goal*, which is wealth maximization.
- II. The second stage of the process is the, (2) Strategic planning; Strategic planning translates the firm's corporate goal into specific policies and directions, sets priorities, specifies the structural, strategic and tactical areas of business development, and guides the planning process in the pursuit of solid objectives with feedback loops at different stages.
- III. The following two stages, stage 3 and 4 can be grouped as, (3) Identification and (4) Preliminary screening, of Investment opportunities.
- IV. Whereas, stage 5, 6, 7 are grouped as evaluation and authorization stages containing; (5) Financial appraisal, quantitative analysis, project evaluation or project analysis, (6) Qualitative factors, judgment and gut feelings, (7) Accept/reject decisions on the projects.
- V. Once the above stages are completed the process will lead to either stage 2 or 5. Stage 2 if the decision is "Reject" as a strategic planning feedback or continues to stage 5 if decision is to "Accept". Stage 5 is Monitoring and control, which in turn containing (8) Implementation (9) Facilitation, monitoring, control and review (10) Continue, expand or abandon project (11) Post-implementation audit.

The process depicted above shows two major difference; (Pike & Neale, 2006) start from the budgeting and financing of the project, whereas, (Dayananda, et al., 2002) start from the firm objective and strategic planning. These stages should be combined to form an efficient planning of capital projects in the strategic plan based on viable availability of financing from the market.

The second major difference is, despite the fact that both are focusing in the financial appraisal stage of the process, (Pike & Neale, 2006) stress the importance of focusing in the overall process of capital budgeting, whereas (Dayananda, et al., 2002) are more focused on the financial appraisal aspect of the process.



A more financial appraisal focused capital budgeting process is also provided by (Brown, et al., 2010) this authors, stated that financial manages, to complete the capital budgeting process, use the four distinct stages. The stages described by (Brown, et al., 2010) are similar with the stages indicated by (Dayananda, et al., 2002), that is with the exception of post audit. The stages described here are; (1) Determine the initial cost of the project, (2) Determine the incremental cash flow of the project, (3) Select the capital budgeting method and, (4) Conduct post audit.

Accordingly, based on the process explained above, the capital budgeting process can be presented in a simplified chart as below;

Figure 2-The Capital Budgeting Process



Source; *Compiled based on;* (Brown, et al., 2010) *and* (Dayananda, et al., 2002)

### 2.1.3 Information System-Basic concepts

Information system as a concept developed with the growth and complexity of organizations. Accordingly, different authors have engaged the definition by taking the contemporary setting and demand of organizations in to consideration. (Schneider & Valacich, 2009) explained the concept by focusing on the elements involved and the process it follows, as “*a combination of hardware, software, and telecommunications networks that people build and use to collect, create, and distribute useful data, typically in organizational Settings.*” Whereas, (Laudon & Laudon, 2011)

engage the concept from the objective it serves as, *“Information System is interrelated components working together to collect, process, store, and Disseminate information to support decision making, coordination, control, analysis, and visualization in an organization.”*

As both the above definitions show, information system is a concept that operates within the framework of organization. Moreover, the concept as defined has a set of elements that constitute it, (Irani, 2002) states that with the importance of developing a robust information system, managers invest in the elements of information system, “Hardware, people, data, and software” are one of the most important expenditure decisions to be made. With this, (Irani, 2002), showed that information systems constitute a set of elements, as specified.

(Bourgeois, 2014) on the same assertion states that information system has 6 major components classified into 2 basic groups, Technological and non-technological. Within the technological group of elements, (Bourgeois, 2014) included, hardware, software and data with communication/networking being an additional element due to its added future to the earlier hardware and software concepts. Hardware represents the physical components of the technology, Software is an intangible element that contains a set of instructions that tells the hardware what to do, whereas data is a collection of facts about the process of the organization.

As to the non-technological elements of information system, (Bourgeois, 2014) included people and process. People are elements that design and use the system, and process represents the objective of information system, such as the process of operation and control that is to be enhanced by the information system.

With this description of information system, (Bourgeois, 2014), explained how easily the concept is misperceived as a pure technological subject by ignoring all the non-technological elements.

In this context, it is also important to understand the types of information systems that may exist in an organization based on the purpose they are used to serve;

- I. Transaction Processing Systems (TPS):** are the basic business systems that serve the operational level of the organization. A transaction processing system is a computerized system that records and processes the day-to-day routine transactions necessary to conduct business. Examples are sales order entry, hotel reservation systems, payroll... etc (Hamilton & Anderson, 2003)

- II. Management Information Systems (MIS):** serve the management level of the organization, providing managers with reports and often online access to the organization's current performance and historical records. Typically, MIS are oriented almost exclusively to internal, not environmental or external, events. (Tom, et al., 2005)
- III. Decision- Support Systems (DSS) and Executive Support Systems (ESS):** decision support systems are computerized systems that serve the management level of the organization and help managers make decisions. Although (DSS) use internal information from (TPS) and (MIS), They often bring information from external sources, such as current stock prices or product prices of competitors. (French, 2007). whereas, executive support systems are computer-based information systems which serve the strategic level of the organization, and help senior managers to make decisions. (Vandenbosch & Higgins, 1995)
- IV. Knowledge-Based Information Systems (KBIS):** is an applications of artificial intelligence in businessis such as the development of expert systems and other knowledge-based information systems. Expert systems (ES) are knowledge-based (KBIS) that uses its knowledge about a specific, complex application area to act as an expert consultant to end users (Alavi & Leidner, 2006).
- V. Office Automation System and Electronic Communications Systems:** are computer-based information systems that collect, process, store, and transmit electronic messages, documents, and other forms of communications among individuals, work groups, and organizations in seconds, not hours or days. This includes e-mail, voice mail, and teleconferencing. (Hamilton & Anderson, 2003) and (Adams & Todd, 2003).

#### **2.1.4 Information System in Businesses and Banking**

Over the past years, organizations all over the world have invested significantly in information systems (IS). It is widely believed that investment in information systems will enable firms cut costs and compete strategically and effectively (Butler & Gray, 2006). Accordingly, (Robson, 1997) states that, despite the expected large outlay, risky financial institutions are one of the largest investors in IS.

In this regard, (Garbage and Silber 1978) assert that, the past 25 years have witnessed a vast reductions in the cost of information technology, where between the years 1995 and 2005, the computing power of the average personal computers increased tremendously, while the price declined. Consequently, (Garbage and Silber 1978) state that, the introduction of telecommunications into banking markets dates to 1846 when the telegraph reduced stock price differentials between New York and regional stock markets. At the same time, a revolution in telecommunications reduced the cost of transmitting data by a high margin since 1990. Such cost reductions have made it less expensive to acquire, store, transmit, and transform data into information.

Due to this advancement in the technology, (Mashhour & Zaatreh, 2008) states that, enormous changes in the services of the financial institution has taken place. The distinctive delivery of banking services in retail markets was to change with the use of commercial computer power. For commercial banking worldwide, these advances in IT have resulted in dramatic productivity gains. One early example was the introduction of the automatic teller machine (ATM), which first appeared in the United States in 1968. The introduction of ATMs made the distribution of some banking services more efficient.

Hence (Mashhour & Zaatreh, 2008), who has done an extensive study on Jordanian banks IS investment effectiveness, state that IT has developed the competition between financial institutions. Many new banking innovative strategies emerged from a new or enhanced banking information systems, which include e-banking, smartcard system or enhancement of other payment card system. Accordingly, (Mashhour & Zaatreh, 2008) asks, in this complex environment, how can information technology investments create value for the financial services organizations? In answering this, (Mashhour & Zaatreh, 2008) refer to, (Read et al, 2001) whom stats that “At its simplest level, value is created by generating revenues from the delivery of products and services to customers that exceed the cost of the delivery process”. Thus, impact of information technology on value creation can happen either through increasing revenues at marginal cost, or through reducing costs at marginal changes in revenue of the bussiness.

### 2.1.5 Nature and Objective of Information System Investments

(Gunasekaran, et al., 2001) state that, there has been a rising trend in IT expenditure over the last two decades (Benchmark Research, 1997), which corresponds to the mass of IT products now available in the market. Such new products pose in ever increasing problem to managers, as they constantly have to invest and justify their decisions to update software and hardware to keep abreast of their competitors.

With this, (Gunasekaran, et al., 2001) further states, together with the rising expenditure trends managers are faced with the problem of having to constantly: (1) Identify what their competitors are doing with IT, (2) Determine whether or not they can remain competitive with or without IT; and (3) Evaluate how the adoption of IT can improve their performance and/or competitiveness.

Hence, asserts that, careful and correct IT investment (or project selection) decisions are an economic and competitive necessity. In elaborating this, (Carlyle, 1990) as cited by (Gunasekaran, et al., 2001) states that, increasing financial and competitive pressures can necessitate companies to cut costs and force them to scrutinize their IT operating and capital budgets more carefully, so as to allocate limited resources among competing projects in the best way possible.

In this regard a careful look at the process of IS investment is appropriate. In doing so, (Khakasa, 2009) states that, there is no uniform definition of or understanding of what constitutes an IS investment, and not all investments are of capital nature. However, taking the definitions offered by (Schneider & Valacich, 2009; Laudon & Laudon, 2011) above, it would be an investment made on the technological elements of an organizations Information System. Accordingly, (Bacon, 1992) defined IS/IT investment as *“any acquisition of computer hardware, network facilities, or pre-developed software, or any “in-house” systems development project, that is expected to add to or enhance an organization’s information systems capabilities and produce benefits beyond the short term”*.

Further elaborating the definition of (Bacon, 1992), IS/IT investment is an acquisition or development of technological elements of an information system, in this commitment, the basic objective of the firm is to enhance an organizations information system through the deployment of a technologically advanced IST/IT. In addition (Bacon, 1992) tells us that the benefits gained through such investments is expected to be realized in the long term.

(Irani & Love, 2008) explained this nature and scope of technology investment decision-making by labeling the process as “complicated and ever-changing”. The reason for this is that there has been a continuous expansion of the boundaries surrounding the evaluation domain often grounded in the changing impact that IT offers through its advancement. The change in such boundaries is in part attributable to new technology (increased, scope, functionality and flexibility) and its impact (in human and organizational terms) on developing a new organizational IS infrastructure, juxtaposed with the many interacting socio-technical dimensions that support an organization.

Hence, (Irani & Love, 2008) conclude that, investment decision-makers not only need to have the skill to evaluate the nuts and bolts of the technology sought but also need the foresight to assess its impact on the future of the organization and the people that rely on and use the system. Such impact may lie, in terms of the integration links, with existing and future systems, benefit realization, stakeholder exploitation, cost management (direct and indirect) and risk minimization.

## **2.1.6 Evaluation of Information System Investments**

### **2.1.6.1 Independent Evaluation Approaches**

(Khakasa, 2009) states that, in most literatures the word appraisal and evaluation are used interchangeably, however, (Ballantine & Stray, 1999) argued that, the term ‘Evaluation’ is usually used to referred to the holistic consideration of IS projects at different times such as, prior, during and after IS project; however, the term ‘Appraisal’ is more fitting to the feasibility study of a project.

With this, (Morton, 1991; Hitt & Brynjolfsson, 1996 and Hayward et al, 2002), in contrast to the famous “Productivity Paradox” asserted that, benefits from IS/IT do in fact exist, but are not captured by the organization. In line with this, (Grembergen, 2001) defined IS investment evaluation as “the weighing up process to rationally assess the value of any acquisition of software or hardware which is expected to improve the business value of an organizations IS”.

Accordingly, (Stone, 1990) points out that, several frameworks have been proposed to guide the choice among IS evaluation methodologies. These frames include defining objectives and measures, considering qualitative effects from IS, and considering and integrating differing evaluative viewpoints. In line with this, (Symons, 1991) established that; debates on the problem of IS appraisal made from the mid-1980s onwards had two dimensions, namely content and

process. **Content** deals with specific technical aspects of evaluation metrics or combinations of metrics used in evaluation. **Process** was concerned with how evaluation, as a business process, was or should be carried out.

Hence, (Frisk, et al., 2014), established that, IS investment was increasingly conceived of as requiring a multi-objective, multi-criteria and multi-stakeholder evaluation and decision process. This dimension of multiple forms of measurement, in turn raised the problem of metric selection. In the literature most of the attention was given to content, while process was often present only in as much as it dealt with the mechanics of the method in question. For multi-metric evaluation, the question of how one arrived at the right mix of such methods was handled, if it was discussed at all, only at a broad conceptual level.

Consequently, (Hochstrasser & Griffiths, 1991) identified the overwhelming belief of many industries that they are faced with outdated and inappropriate procedures for investment appraisal, and that all responsible executives can do is to cast them aside in a bold 'leap of strategic faith'. Correspondingly, (Irani, 2002) by referring to the British (CIMA/IProE, 1987) advocated, this investment strategy which states that some benefits of IT/IS cannot be quantified, and as a result an act of faith approach may be necessary.

Regardless, (Irani, 2002) argued that, when the purpose of IT investments are to improve operational efficiency, many traditional appraisal techniques may be considered appropriate. Such investments are largely geared to the generation of tangible (financial) benefits, and are based on direct (financial) project costs. However, many managers are now appreciating the wider strategic implications of developing a robust and responsive IT infrastructure, yet this in turn presents businesses with the dilemma of how to assess, quantify and accommodate the implications of infrastructural investments within traditional methods of appraisal.

In line with this, notably, (Irani, et al., 1997) grouped formal appraisal techniques into four classifications: Namely Economic, Strategic, Analytical and the Integrated, Approaches.

Table 1-Taxinomy of IS Investment Appraisal Approaches

<b>Classification</b>	<b>Appraisal technique</b>	<b>Characteristics</b>
<b>ECONOMIC APPROACHES (ratio based)</b>	Payback	Quantitative in terms of benefits and
	Return on Investment (ROI)*	Quantitative in terms of benefits and costs
	Cost Benefit Analysis (CBA)	Judgmental in nature
<b>Economic approach (discounting techniques)</b>	Net Present Value (NPV)*	Quantitative Financial Technique with Hurdle Rate
	Internal rate of Return (IRR)*	Quantitative Financial Technique with Hurdle Rate
	Real option pricing theory*	Complex Quantitative Financial Technique
<b>Economic approach (future value technique)</b>	Technical importance	Strategic decision as a measure of success
	Competitive advantage*	Integration of strategic, Operational, and Financial decision into measure of success
	Critical success factors*	Judgmental in nature, Integration of strategic, Operational, and Financial decision into measure of success
<b>STRATEGIC APPROACHES</b>	Application portfolio approach*	Judgmental in nature, Integration of strategic, Operational, and Financial decision into measure of success
	Non numeric	Scoring technique with a formal structure to a judgmental approach
	Scoring models*	Scoring technique with a formal structure to a judgmental approach
<b>ANALYTICAL APPROACHES (portfolio)</b>	Computer based techniques	Integrated approach of analytical and numeric solution
	Fuzzy logic	Optimized approach of analytical and numeric solution
<b>ANALYTICAL APPROACHES (other)</b>	Value analysis	Judgmental in nature, Scoring technique with a formal structure to a judgmental approach
	Risk analysis*	Judgmental in nature, Scoring technique with a formal structure to a judgmental approach
	Multi-attribute utility theory*	Judgmental in nature, possible integrated approach where strategic operational and financial decisions



<b>Classification</b>	<b>Appraisal technique</b>	<b>Characteristics</b>
<b>INTEGRATED APPROACHES</b>	Scenario planning and screening	Judgmental in nature, possible integrated approach where strategic operational and financial decisions
	Information economics*	An Approach which considers, Financial aspect first and Strategic criteria next
	Balanced scorecard*	possible integrated approach where strategic operational and financial decisions
	Gut feeling*	Purely Judgmental in nature

*Source; Adopted from (Irani, et al., 1997)*

### **i. Economic Approaches**

(Ballantine & Stray, 1999) state that, capital budgeting methods have been adopted in financially appraising capital investments in IS. Such methods make use of cash flow and ratio based methods. Cash flow methods in turn, are classified as Discounted Cash flow (DCF) and non-discounted cash flow method, i.e. Internal Rate of Return (IRR) and Net Present Value (NPV). On the other hand, ratio based techniques include, Payback Period (PBP), Return on Investment (RO), Return on Assets (ROA). In addition to this, real option pricing is also another method used in financial appraisal of IS/It investments; for detail list of financial appraisal methods, see finance and accounting texts such as (Brealey, et al., 2007; Shapiro, 2004)

In relation to this, regardless of the financial appraisal techniques adopted by the firm in IS investment selection (Bacon, 1992) found out that budgetary constraints as a financial criterions figured the most, by relating the same with budgets. Of the companies surveyed by (Bacon, 1992) 68 percent use budgetary constraint as a project investment approval criterion. It is applied by those companies that use it as a criterion to 64 percent of their projects. This trend is attributed to the need for improved planning and control in the use of IS resources in some companies.

### **ii. Strategic approach**

(Laudon, et al., 2013) have constantly raised continued reservations on the financial appraisal techniques of capital budgeting, which led researchers to advocate for the use of strategic arguments in the appraisal of IS investments.

In line with this, (Hynek, et al., 2009) underlined the fact that economic justification of investment into AMT<sup>4</sup> is one of the three commonly used approaches, however, they advocate that if the economic approach is used, the strategic and analytical implications should also be taken into account and utilized in combination with it for a better understanding of the impact of the project.

(Khakasa, 2009) states that, strategic analysis is concerned with understanding the internal organization of the firm and external business environment in relation to opportunities and threats, and developing business strategies to counter competition. In the same note, (Small 2006) proposes the use of criteria such as comparison with competitors, the retention, attainment or perception of industry leadership, and expected future developments in the industry, which serve as alternative factors of evaluation, to the purely financial criteria's of decision makers to approve IS projects.

In line with this process, adopting a strategic approach to managing IS investment requires that each potential project is appraised to establish its "strategic fit" in the overall business, as its usage will have an effect on the business in the long run. (Beimborn, et al., 2007) Emphasized the importance of evaluating the strategic fit of individual projects. Similar studies, (Issa-Salwe, et al., 2010; Gutierrez, 2014) have shown that misalignment, or the lack of alignment, between IS and business strategies is one of the main reasons why organizations fail to realize the full potential of their IS investments. Consequently, organizations that have accomplished a high degree of alignment between business and IS are often associated with better overall business performance, and this alignment can only be achieved if fitting information systems are acquired on the outset.

(Khakasa, 2009) asserts that, *"it is however important to note that in order for a firm to effectively evaluate the strategic fit of potential IS projects to the business, there need to be an existing overall IS strategy in which future investments in IS have already been forecasted and planned"*.

Different scholars<sup>5</sup> have illustrated how several tools and models can be employed in evaluating the strategic fit of IS projects or SISP<sup>6</sup>. Among the most widely accepted techniques are value chain analysis, competitive analysis, appraisal of critical success factors and the adoption of an applications portfolio approach to investment appraisal.

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<sup>4</sup> Advanced Manufacturing Technology

<sup>5</sup> see (Wilkin & Cerpa, 2012) (Wang, 2014)

<sup>6</sup> Strategic Information Systems Planning

(Strassmann & Bienkowski, 1999) Argued against the assertion that, from a strategic standpoint, IS appraisal is effective only when intangible criteria are incorporated into the analysis. In turn, they propose that IS investments can only be aligned to overall business strategy if emphasis is placed on determining the expected financial returns. They however disregard the measurement of non-financial measures like market share and customer satisfaction, and consider financial returns as more significant since they can be incorporated into the financial budget, and proponents can be held accountable to them.

Despite being beneficial for firms as illustrated above, there are downsides to the exclusive use of these methods (Powell, 1992) argues that firms that adopt the strategic perspective to IS investments devote less effort in appraising projects due to competition or "perceived competition".

In a different survey of the use of decision support systems in accounting, (Powell, 1992) found that firms adopted the new technology for the sake of corporate image, so as not to be seen as lagging behind their competition. Thus, these projects were exempted from the normal review process established in the firm.

### **iii. Analytic Approach**

(Locher, et al., 2004) states that the move towards merging economic and strategic approaches has seen the evolution of several weighted scoring models which allow management to assign weights to each tangible and intangible factor under consideration. Analytic investment appraisal techniques collect more information and frequently consider uncertainty and multiple measures and effects.

Accordingly, (Meredith & Suresh, 1986) assert that, the superiority of these techniques is that they are more realistic, taking more factors and subjective judgments into account, and hence better reflect reality as understood by knowledgeable managers. However, (Irani, et al., 1997) states, analytical approaches of IS investment evaluation are structured in design but subjective in nature, with their use often including project risk besides tangible and intangible factors. Scoring models, risk analysis, simulation modeling and value analysis are among the most commonly discussed techniques in IS evaluation literature.

In a more prospective look, (Bandyopadhyay, et al., 1999) provide an insight by stating that, as spending on IS rises steeply, organizations become increasingly technology-dependent and, consequently, they become highly vulnerable to the risks of IS failure. To challenge this, (Clemons, 1990) as cited by (Khakasa, 2009), proposes that components of IS risk such as technical, project, financial, functionality, environmental and systemic risk should be actively managed while undertaking strategic IS programs. Not assessing the risk of an IS investment could result in failure to obtain some or all of the anticipated benefits, incurring more costs than originally anticipated. (Khakasa, 2009) Stats that, researchers have analyzed several approaches to risk analysis for IS investments, such as Real Option Analysis. This includes value-at-risk portfolio analysis techniques, most of which have been informed by literature from financial economics.

In addition to this, (Giaglis, et al., 1999) provide an approach called simulation modeling and analysis, which has been used to support the process of identifying business change opportunities and evaluating IS investments. Simulation as an appraisal technique allows organizations to experiment with various alternative decisions and assess the impact of each alternative on business performance for investments that are expected to yield intangible and/or indirect benefits as opposed to hard or strategic ones.

#### **iv. Integrated approach**

Different Studies<sup>7</sup> have promoted integrated appraisal approaches as a means to tackle the problems inherent in using purely financial or purely strategic appraisal approaches.

(Locher, et al., 2004) The benefits of IS investments cannot be conducted in the same way as other capital budgeting decision because IS usually do not cause direct and measurable financial inflows. For this reason assessing the benefits of an IS project is very challenging. Hence, they propose, in IS profitability controlling qualitative decision methods play an important role besides the known quantitative ones.

In justifying their point, (Locher, et al., 2004) asserts that, while the results of quantitative instruments can be compared to each other using a linear scale, qualitative instruments lead to an

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<sup>7</sup> See (Locher, et al., 2004)

ordinal order of results. The decision on the adequate method depends on the character of the project, the range of its consequences on organizational structures and business processes as well as on its financial volume.

In the same note, (Stewart & Mohamed, 2002) emphasis on the same point by stating that, integrated approaches combine somewhat subjective strategic approaches with formal structure found in economic approaches. Appraisal techniques in this approach integrate financial and nonfinancial dimensions together, through the acknowledgement and assignment of weighting factors to the intangible implications of the project, usually incorporating project risk.

On the other hand more specific integrated approaches includes, Information Economics, developed by (Parker & Benson, 1988). In this technique, value is seen as a broader concept based on the effect an IS investment has on the business performance of the firm. It seeks to identify and measure or rank the economic impact of the changes brought about by the introduction of the new system on the firm's performance. Building on traditional cost benefit analysis with four additional techniques (value linking, value acceleration, value restructuring and innovation valuation) to establish an enhanced return on investment calculation (EROI), information economics incorporates a business domain assessment (BDA) and a technical domain assessment (TDA). The BDA considers business factors such as strategic match, competitive advantage, management information support, competitive response and project and organizational risk, while the TDA considers technical factors such as strategic IS architecture and IS infrastructure risk. The value or economic impact of IS is then determined by combining the EROI, BDA and TDA. Although this technique appears mechanical, and contains a subjective basis of many of the scores, it provides a useful checklist for assessing the wider impact of introducing systems, rather than focusing on limited financial data (Grembergen, 2001) as cite by (Khakasa, 2009)

The other approach to this is Balanced Scorecard, an idea introduced first by (Kaplan & Norton, 1992), with the title of Balanced Scorecard system for measuring financial performance. This approach argued that traditional financial accounting measures such as return on investment can only give limited or even misleading signals for competitive business activities. In addition to applying the Balanced Scorecard as a performance management tool for business as a whole, attempts have been made to apply this tool to narrowly defamed corporate functions, such as the IS department. Expanding on the same approach, (Silvius, 2006) proposes an 'IT Balanced

Scorecard', enriched with the customer perspective showing the impact of the investment on the marketing proposition of the organization, the impact of the investment on the business processes and possible competitive effects of the investment.

(Khakasa, 2009) states, that, although the balanced scorecard technique relatively reduces the number of measures that managers should consider while evaluating potential investments, different studies<sup>8</sup> argues that this technique could fail because it incorrectly identifies nonfinancial variables as the drivers of performance, its metrics are poorly identified and high-level goals are not broken down into feasible sub-processes.

#### **v. Act of Faith**

Although firms have adopted a more complex approach to evaluating IS investments, (Small, 2006) states that, they are not utilizing these sophisticated techniques developed by academicians as a means of improving justification decisions. This phenomenon may be attributed to the difficulty in understanding and applying these techniques, which continue to evolve along different paths and are extremely difficult to complement or otherwise synthesize, even where attempts are made to do so.

As a result of the above fact, managers often make decision based on personal judgments, by referring to (Gervais, 2009), who states that capital budgeting decisions are not well suited for learning, as learning occurs “when closely similar problems are frequently encountered, especially if the outcomes of decisions are quickly known and provide unequivocal feedback.” In most firms, managers infrequently encounter major investment policy decisions, experience long delays before learning the outcomes of projects, and usually receive noisy feedback. Such decisions as per (Weill & Olson, 1989) are based on 'acts of faith', 'blind faith' or 'gut instinct'. These methods have often been used in very complex decisions, or due to the lack of adequate guidelines for evaluating investments (Weill & Olson, 1989).

#### **2.1.6.2 Comprehensive Evaluation Approaches**

IT/IS investment justification has proven to be a complex issue. And scholars have attributed this fact to the many intangibles and non-financial benefits inherent in the implementation process of

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<sup>8</sup> See (Schneiderman, 1999)

IS. In contrary to this, (Gunasekaran, et al., 2001) made a case for the justification of IT by arguing that managers must embrace various appraisal techniques such as IT budgeting, IT investment management, IT project planning, investment budgeting, payback period performance metrics and return on investment (ROI).

Accordingly, a multitude of studies are conducted by different authors, (Gunasekaran, et al., 2001; Frisk, et al., 2014; Irani, 2002; Irani & Love, 2002; Mashhour & Zaatreh, 2008; Irani, 2002; Parker & Benson, 1988). Most of this studies stressed on the lack of adequate empirical research in the area and the downsides of independent IS/IT investment evaluation methods, regardless of the fact whether the methods are applied in combination of one another or not. With this they offer a practical framework of evaluation that are specifically designed for specific organizations.

In this regard, (Frisk, et al., 2014) explained that, a feature of the extensive literature on multi-stakeholder, multi-criteria IS evaluation is that much of it is conceptual in the sense that it is not well grounded in empirical research. In this he used Information Economics of (Parker & Benson, 1988) as a good example, which he claimed is discussed in the context of an imaginary company. The approach essentially evaluates, scores and ranks IT investments by: the potential positive and negative impacts it has, through the use of a series of predefined criteria classified into; business (ROI, strategic match) and technical (technical uncertainty, infrastructure risk).

Accordingly, (Frisk, et al., 2014) proposes, the value dials approach as a proper empirical approach. The approach is based on the combination of dialogical action research methodology with the elements of the Delphi method and the BSC in order to develop an evaluation framework for a given organization, in a given environment and looking at a given project. Here, (Frisk, et al., 2014) explains that, the method is a form of dynamism that enables the contextual construction of the business value constructs (referred in the study as, value dials) by which the implicit construct will be measured. It is, in effect, an adaptation and operationalization of (Peffer and Dos Santos, 2013) ideas. With this, a value dials approach is designed to address (1) linkages between different types of performance and (2) perceived benefits that are dependent on the respective stakeholders. Furthermore, the research addresses the question ‘How can we yield a comprehensive, consistent and precise understanding of the multifaceted construct “IS business value?” which is part of the six research thrusts of (Schryen, 2013).

In a similar work, (Gunasekaran, et al., 2001) states that companies that used traditional approaches to justify the implementation of IT indicated a degree of uncertainty about how to measure the full impact of their investment. And further states, that there is no 'best' appraisal technique that addresses 'all' project considerations And argues that the reason for this is that strategic investments in IT are aggregates of complexity, and notably different from each other. Essentially, each investment displays its own characteristics, and offers a range of benefits and costs. Conversely, each appraisal technique that can be used also displays its own characteristics, and has its own set of limitations (Irani, Ezingard, & Grieve, 1997; Peppard & Ward, 1999; Hares & Royle, 1994).

Therefore, (Gunasekaran, et al., 2001) asserts that, the development of an 'all embracing' generic appraisal technique for justifying IT expenditure that takes account of the wide variety of IT related implications, may be considered too rigid and complex for use. Which they substantiate based on (Parker & Benson, 1988), in that they state that, most CEOs are not comfortable with the current tools and techniques used to justify their investments in IT, because they lack the preciseness of definition in the financial methods used.

Therefore, concludes (Gunasekaran, et al., 2001), the apparent inability of traditional modes of financial analysis to justify certain investments has led to a growing number of managers and observers to call for a moratorium in their use. Consequently, as a remedy to this, (Gunasekaran, et al., 2001) a conceptual survey and findings from a complementing case study has proposes a model that can be used to determine the effectiveness of implementing IT at the strategic, tactical and operational levels, with a capability of determining intangible and non-financial benefits.

In a more hands-on evaluation of IS investment, (Mashhour & Zaatreh, 2008) conducted a concrete practical study on the effectiveness of Information technology in the banking sector of Jordanian banks. In the study, they ask, in this complex environment, how can information technology investments create value for the financial services organizations?

In an attempt to answer their question, they engage the concept by referring to (Read et al, 2001) who states that "at its simplest level, value is created by generating revenues from the delivery of products and services to customers that exceed the cost of the delivery process". And further claim that, several frameworks have been proposed to guide the choice among IS evaluation methodologies by (Stone, 1990). The frameworks included defining objectives and measures,



considering qualitative effects from IS, and considering and integrating differing evaluative viewpoints. From such, the framework of MIS as a contingency model and efficiency models of (Allen et al, 2006; Pehlivan & Kirkpatrick, 1990; Gupta and Collins, 1997) pointed out different aspects of efficiency measurements.

Here the major assessment tool adopted by (Mashhour & Zaatreh, 2008), was the tool designed to measure perception on adopting information technology. The tool was is developed by (Moore & Benbasat, 1991). The instrument developed by this authors discusses user's perception of adopting \IS innovation.

In this instrument development (Moore & Benbasat, 1991) have conducted an extensive study of existing measurement tools. Following that, being convinced that the exiting measurements are not comprehensive enough, with each lacking completeness, they have undergone through a rigorous instrument development process. Based on this instruments, (Mashhour & Zaatreh, 2008) designed a survey that was intended to assess the effectiveness of IT investment in Jordanian banks.

In the instrument of (Moore & Benbasat, 1991) they have identified 8 assessment variables. The variables were developed based on the works of various scholars, (Rogers, 1883; Ronal, 1987; Hurt & Hubbard, 1987; Larcker & Lessig, 1980,; Tornatzky & Klien, 1982 ). Each of the scholars have proposed one or more of the variables, lacking completeness. Accordingly, (Moore & Benbasat, 1991) developed a complete list of variables for the assessment perceptions on IT innovation adoptions.

Out of the available variables, (Mashhour & Zaatreh, 2008) used the relative advantage variable to determine IT's relative advantage. In doing so, they used the variable in combination with other assessment variables adopted from the works of (Idowu et al, 2002). The variables used in (Mashhour & Zaatreh, 2008) study as indicated by (Moore & Benbasat, 1991) is much related with "compatibility" variable, however was not used in not included in their study. This variable, based on the sorting exercise, proved it is a separately item worth consideration together with relative advantage variable as there exists a strong correlation with the relative advantage variable.

The respective variables and the specific survey items include, the below;

Table 2-IT investment assessment survey variables

No	Variables	Contents of the variables
1	Relative Advantage	Information Technology have decreased the task execution time of users.
		Information Technology have decreased the task execution time of users.
		Information Technology have decreased the task execution time of users.
		Information Technology have decreased the task execution time of users.
		Information Technology have decreased the task execution time of users.
		Information Technology have decreased the task execution time of users.
		Information Technology have decreased the task execution time of users.
		Information Technology have decreased the task execution time of users.
2	Compatibility	The Information Technology investment is compatible with all aspects of the banks work.
		The Information Technology investment is compatible with all aspects of the banks work.
		The Information Technology investment is compatible with all aspects of the banks work.
		The Information Technology investment is compatible with all aspects of the banks work.

Source; Adopted from (Moore & Benbasat, 1991)

The above variables have undergone through a robust development process that included identifying, sorting, grouping and performing a series of consistency and reliability tests. Thus, by using the variables developed in this manner there were used to collect the perception of the target study subjects to determine the success of an IS/IT investment in Jordanian banks by (Mashhour & Zaatreh, 2008).

In the study, the authors have used the respective variables to test their hypothesis that claims “Information systems provide a competitive advantage to the banking industry”. In doing so they considered the individual mean and the group construct mean of the results.

## 2.2 Review of Empirical Literature

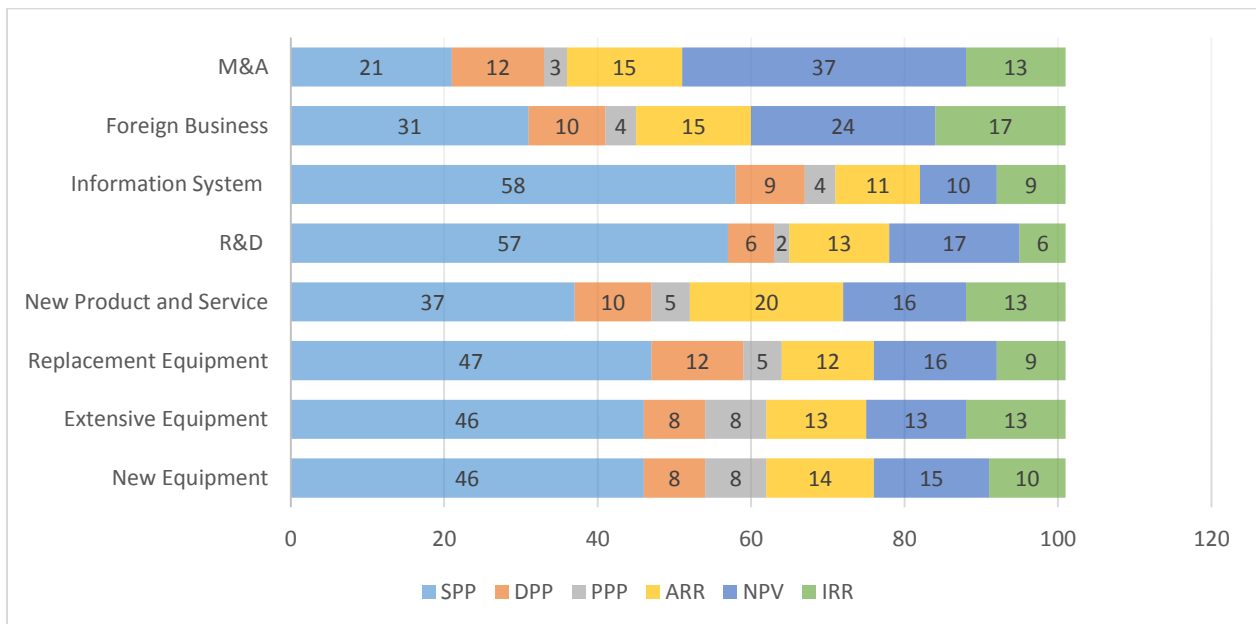
### 2.2.1 International Experience

(Shinoda, 2010) Studied the capital budgeting management practices in Japan, in the study, the researcher showed that there is a gap between finance literature and practice. In doing so, the author engaged the subject by classifying the study in two to major groups, and presented the data based on frequency of use of capital budgeting methods and types of investments aligned with capital budgeting methods used to evaluate them.

In the survey he reveals that 30.5% of the respondents frequently (“always” and often” combined) used Net Present Value (NPV) method. If “sometimes” category is included, the cumulative use of NPV climbs to 50.5% of the firms.

In addition to the frequency of use, (Shinoda, 2010), offered an insight by stating that; “First, managers in Japanese firms consider payback periods to be of value when they make a decision that are related to simple investment plans, for example, investment in equipment. Second, when managers of Japanese firms examine the propriety of *R&D* investments and investment in *information system*, they consider payback periods as the most important criterion.” In this regard he presented a chart that shows the Japanese firms use of capital budgeting based on the type of investment they appraise.

Figure 3-Types of Investments and Capital Budgeting Methods



Adopted from (Shinoda, 2010)

(\*) The numbers in Figure-5 represent the percentage of the method that managers consider as the most important in terms of each of the eight types of investment.

In a similar study, (Gitman & Forrester, 1977) made a survey to find out what capital budgeting techniques were being used by 103 major U.S. companies. The survey contained questions concerning capital budgeting techniques, the most important and most difficult stages of capital budgeting, the cut-off rate and the methods used to assess risk. The response showed that the most difficult and most important stage of the process involves the definition and estimation of cash flows. In addition, sophisticated techniques for primary analysis were most popular, such as internal rate of return. For secondary analysis, the use of the payback period was indicated by a large number of respondents.

(Ballantine & Stray, 1999) Studied the extent to which financial techniques are used to appraise IS investments. The survey examined the IS/IT appraisal practices of a sample of 98 organizations with a response rate of 55% consisting mainly of organizations from the manufacturing, construction, electronics and engineering, and wholesale/retail sectors drawn from the Times' Top 1000 companies. They study showed that the majority of companies (72%) in the study used cost benefit analysis to appraise the feasibility of the most recent project, the next most popular techniques used being payback and Return on Investment (ROD/Accounting Rate of Return (ARR). Only 24% of respondent organizations use the more sophisticated discounted cash flow techniques of NPV and IRR to appraise feasibility, a level of usage the authors consider small. The profitability index (PI) and return on management (ROM) were rarely used to appraise the most recent project. The survey also identified various problems with the IS/IT investment decision-making process that is related to understanding, execution, and interpretation of the Capital budgeting methods.

In a more specific study, (Bacon, 1992) investigated the criteria firms use in IS investment. In the survey, fifteen criteria's were used; out of which six being financial, six management, and three development. The survey was made on 80 major companies in four countries: US, Britain, Australia, and New Zealand. The companies were asked to indicate which criteria they use, the percentage of projects to which each criterion is applied, and the overall ranking in terms of total project value for each criterion. The results show that discounted cash flow is used as an investment criterion for 1<sup>ST</sup> ranked projects by about 75 percent of the Fortune 500 type of companies that

participated in the survey. Overall, DCF techniques are applied to only 40 percent of all projects in the sample, although it is evident that DCF is important in the evaluation of large projects. Except for the Budgetary Constraint criterion, the Payback Method is the most widely used financial criterion. Response to competitive systems is used as an investment criterion by 61% of the companies in the sample, by whom it is ranked sixth out of 15 in importance.

In a more practical and framework based case study made by (Gunasekaran, et al., 2001), they identified a more conceptual understanding of evaluating IT\IS investment by making use of a descriptive research approach analyzing Strategic, Tactical and Operational methods, that include tangible and intangible form. Accordingly, the findings from the case study have indicated that the current accountancy evaluation process, for investment justification in IT such as ROI is not sufficient to warrant an investment decision. There are many intangible benefits offered by IT, which are not of a quantifiable nature but essential to the endurance of a company.

Hence, they recommend that, when implementing IT, overall consideration must be given to the company's organizational strategy and full support and commitment of the company must be in place before commencing any projects. Hence, in particular an organization's IT manager should have full knowledge of the company's strategy, commitment from management employees are also some of the important issues that need to be considered when contemplating an investment in IT. Tactical considerations are equally consequential in the success of an IT project, as there should be measures to monitor the success of the investment. These performance measures should be constantly monitored to ensure that the project is progressing in line with the aim and objectives of the project as well as the organization's strategy.

Whereas, (Mashhour & Zaatreh, 2008) based on a research that is based on a descriptive study made based on a frame work survey to evaluate, (1) Information systems competitive Advantage to the banking industry (2) The effectiveness of information systems and its impact on Jordanian banks, (3) The association between the use of information systems and customer satisfaction.

The study made use of the survey's statistical distribution, in that, the effect of using information systems on banks competitiveness was measured using the average score of the survey response made in regards to IT impact on banks, in the survey a likert scale was used that with "1" and "7" standing for "extremely agree" and "extremely disagree" respectively. In this way a higher score in these questions indicates that information systems provide a competitive advantage for banks.

The descriptive statistics indicates that the mean score for effectiveness of information systems on Jordan banks is 5.68 with a standard deviation of 1.184, in a scale of 1 to 7. Based on the testing result, the study concludes that information systems has a positive impact on Jordan banks, and does so at a very high degree of confidence (at least 99.9%).

Whereas, the effectiveness of information systems was measured using the average score of the relating survey questions, with a higher score in these questions represents higher level of effectiveness of information systems on banking. The descriptive statistics indicates that the mean score for effectiveness of information systems on Jordan banks is 4.78 with a standard deviation of 1.18, in a scale of 1 to 7. Based on the testing result, the study concludes that information systems have a positive impact on Jordanian banks.

As to the measurement of association between information systems usage and customer satisfaction, the Pearson correlation coefficient was used. The result showed that, the use of information systems in banking and customer satisfaction was found to be 0.17 and the corresponding P-value at 0.39 or 4%. This means the positive correlation between the two measurements is statistically significant (at 5% significant level), hence the hypothesis being accepted, showing existence between use of IT and Customer satisfaction.

### **2.2.2 Regional Experience**

(Sibanda, 2012) Studied the capital budgeting technique used by companies listed in the South Africa's Stock Exchange, and the study showed that the firms responded use IRR 41.7 % and NVP 33% in their primary analysis. In addition, the study showed that, the firms in the study used secondary analysis techniques, the most favored technique in such analysis is Subjective Judgment which is used by 33 % of the firms, followed by NVP and Pay Back method which are used by 25 % of the each firm, and other methods such as Profitability index, ARR, IRR Discounted Pay Back, used by 8.3% of the respondents.

In a very similar research made by (Khakasa, 2009), a survey was made to study what appraisal method are being used by on Kenyan Commercial banks in apprising their IT/IS investments. In the study the banks were offered a list of evaluation options, including; Financial/Economic, Strategic, Analytical and Integrated Approaches. In the results, which had 25 usable responses out of 41 banks, showed that the firms used at least one of the economic techniques to appraise

potential IS projects and most institutions used more than one financial technique to appraise their investments. The most popular economic technique identified in the study was the Cost Benefit Analysis (CBA) method which has a usage rate of 92%, while Internal Rate of Return (IRR) ranked the lowest with 0%. Ratio based techniques were found to be very popular, with 100% of the respondents using them to evaluate IS projects. Besides, Payback Period and Return on Investment were both used by 60% of the responding institutions. Only 8% of banking institutions use at least one of the discounting techniques. Net Present value is used by 8% of the banks, while IRR is used by none of the responding banks. Overall, the limited use of discounting techniques raises questions as to the extent of the use of cash flows to appraise potential projects. In addition the study, indicates a strong preference for strategic appraisal techniques. Of the strategic techniques used, technical arguments are used by 92% respondents, followed by Competitive Advantage (64%), and Critical Success factors (CSF) and SWOT analysis, both used by 52% of the institutions. The Applications Portfolio approach was used the least, by 40% of the respondents. In the study, (Khakasa, 2009) showed that, both the analytical and integrated approaches were used the least during IS investment appraisal among Kenyan banking institutions, with the exception of risk analysis, which is being used by 76% of the respondents.

A research that is more similar to this study subjects is the one made by (Dagne, 2010). In the study, which was made on Ethiopian financial institutions, the author investigated the capital budgeting practice made by the financial institutions and the impact of IT on profitability and cost efficiency in six private commercial banks. The findings of this study has revealed that with the exception of one bank all the remaining banks included in the survey have not used project appraisal tools to have an ex ante knowledge of the benefits and costs of IT investments. More over the rationale behind investing on IT was found to be strategic requirement (75%) and to be a leader in use of technology (50%). In addition to this, the study indicated that, high IT capital did not result in a significantly better profit and cost performance compared to the relatively low IT capital banks. Due to at his fact the study focused for the most part, on the analysis of IT capital and firm performance correspondence. Moreover, (Nigussie, 2015) considered the impact of IS on banks performance, and tried to identify the challenges faced. Whereas (Kubie, 2010) tried to show efficiency of service delivery through the use of information systems. In the study, investigation was made on the service delivery process of firms with respect to information technology investments.

## CHAPTER THREE-RESEARCH METHODOLOGY

### 3.1. The Research Design

The study adopted descriptive research designs. The objective of descriptive research, according to (Robson, 2002) is “to portray an accurate profile of persons, events or situations”. In similar previous studies<sup>9</sup> examining IS investments, cross-sectional survey has been a popular research method. Hence, this study also employed a similar cross-sectional survey research design. The research design helps the data collected from this study to be compared with findings documented in past researches.

This comparison will lead to the analysis of any similarities and discrepancies between the collected and documented data, in relation to IS investment appraisal practices effectiveness.

### 3.2. Population and Sampling Method

#### 3.2.1. Population

The study’s target population is banking institutions in Ethiopia. The Ethiopian banking system, according to the National Bank of Ethiopia as of January 2016, consists of 19 institutions, which are all commercial banks, with the exception of one, Development Bank of Ethiopia.

*Table 3-Member Banks in Ethiopia's Banking System as at the Close of January, 2015*

No.	Public Banks
1	Commercial Bank of Ethiopia
2	Construction & Business Bank
3	Development Bank of Ethiopia
	Private Banks
4	Abay Bank
5	Bank of Abyssinia
6	Addis International Bank
7	Awash International Bank
8	Berhan International Bank
9	Buna International Bank
10	Cooperative Bank of Oromia
11	Dashen Bank
12	Debub Global Bank

<sup>9</sup> See (Mashhour & Zaatreh, 2008; Weill & Olson, 1989; Bacon, 1992; Ballantine & Stray, 1999; Small, 2006)



No.	Public Banks
13	Enat Bank
14	Lion International Bank
15	Nib International Bank
16	Oromia International Bank
17	United Bank
18	Wegagen Bank
19	Zemen Bank

Source; Adopted from (NBE, 2014)

### 3.2.2. Sampling

Due to the size of the banking industry in Ethiopia, the whole population of banking institutions are included in this study. Therefore, no sampling procedures was used. It is noted that in comparison to similar studies <sup>10</sup>conducted elsewhere, the size of the population in this study is very small.

## 3.3. Data Type and Collection Methodology

### 3.2.1. Data Type

The main data source of the study is primary data that were collected from the study subjects in a survey form. The goal of surveying is to investigate the investment of information systems at Ethiopian banks and to evaluate the contribution of investments for the bank's operation. To achieve this goal, the research focused on a tested instrument that were used by (Moore & Benbasat, 1991; Khakasa, 2009).

Secondary data has been used only as a complementary data to provide insight in to the industry when required, other than this only primary data has been used.

### 3.2.2. Collection Methodology

The survey questionnaire employed is arranged in four sections, the first section is arranged in multiple choice format, the second and third sections were arranged in standardized close ended "Yes" or "No" scale format, whereas the fourth section was arranged in standardized likert scale. In addition to this the questionnaires gathered information on three major details, (1) The

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<sup>10</sup> See (Mashhour, 2008; Khakasa, 2009; Dayananda, et al., 2002)

institution and the role of the respondent (2) the type of IS acquired, (3) the investment evaluation techniques employed and (4) the value brought by the system.

Previous studies, such as (Bacon, 1992), demonstrated that the decision to invest in IS is justified primarily by IS professionals, and secondarily by finance professionals. Therefore, the head of the IS function, and/or Project management function, primarily and head of the finance function, secondarily, were identified as the most suitable roles to provide response for the survey. Accordingly, the correspondence containing the questionnaire was addressed to each bank so as for it to be responded by the role responsible for justifying the IS investment proposals.

### 3.4. Reliability and Validity

The perception measurement survey instruments used in the study are tested instruments developed by (Moore & Benbasat, 1991). In the instrument development process, the particular authors have conducted both reliability and validity testes on the questionnaire.

In order to test the validity of the questionnaire (Moore & Benbasat, 1991) have made tests on two levels; the first level was on the sorting of the scales, in this stage the authors used professionals on the field and collected feedback on the specific variables of the scales. Secondly, the authors tested the scale on the field, where results have been collected along with comments from the respondents, allowing to ensure the content validity of the instrument

As to the reliability testing, (Moore & Benbasat, 1991) have measured the instruments on two test phases, during the pilot and field tests of the instrument development process. In the testing, which was conducted for each variable of the instrument by using Crombach’s alpha coefficient, the following results were gained, proving the instrument is consistent for application in survey.

*Table 4-Cronbach’s Alpha reliability coefficient*

Variable	Pilot Test		Field test	
	No Items <sup>11</sup>	ALPHA <sup>12</sup>	No Items	ALPHA
Relative Advantage	9	0.9	7	0.95
Compatibility	4	0.81	4	0.88

*Adopted from; (Moore & Benbasat, 1991)*

<sup>11</sup> No Items; the no of items in each variable

<sup>12</sup> ALPHA; Cronbach’s Alpha reliability coefficient

### 3.5. Method of Data Analysis

After collecting and sorting the relevant data using the data collection tools, quantitative responses are sorted, coded, computed, and analyzed using MS-Excel-2013. The appropriate statistical analyses such as frequencies and descriptive analysis were used based on the respective objectives of the study. The analyzed data is presented using tables.

For the first and second sections of the survey, respondents were supplied with a comprehensive list of information technologies and appraisal techniques and were asked to indicate specific techniques they have used in their appraisal process. For each of the response, banks were awarded a score of 1 if they responded “Yes” and 0 if they responded “No”.

For the fourth sections, data was collected by using the Likert’s scale, where the it was process by reducing each response value in to ordinal level.

*Table 5- Ordinal value of likert scale responses*

<b>Scale Value</b>	<b>Salve value</b>
Strongly Agree	5
Agree	4
Neutral	3
Disagree	2
Strongly Disagree	1

*Source; Adapted from (Moore & Benbasat, 1991)*

This was further analyzed by awarding the responses into categories of accept and reject proposition, based on the group construct mean values.

## CHAPTER FOUR-DATA PRESENTATION AND ANALYSIS

The previous chapter discussed the methodology used to conduct the study. In this chapter, the results of the findings are presented in sections according to the research questions.

Out of the 19 questionnaires hand-delivered to the banking institutions, a total of 19 usable responses were obtained with all the questionnaires successfully returning. During the survey, telephone calls were made for clarifications and to encourage the respondents to complete the questionnaire.

### 4.1. Profile of Respondents

In the first section of the survey, it was sought to collect information in regards to the name of the institution and the particular respondent's responsibility within the institution. With this it was attempted to find out the role that is responsible for making the justification when an investment on information system is proposed.

Accordingly, the study revealed that;

*Table 6-Respondednt Role with in the Ethiopian Banks*

<b>Respondents Job Title</b>	<b>No of Responses</b>
IS Head	16
Project Manager	3
Finance Head	0
<b>Total</b>	<b>19</b>

*Source; own compilation of research data (2016)*

This shows that 16% of the banks in Ethiopia make there IT investment decision through the project management role, whereas the remaining 84% of banks rely on the head of the IS for the justification of IS investments.

The result shows that the role responsible for justifying IS investments in Ethiopian Banks matches with studies conducted elsewhere. (Bacon, 1992) In a study of the criteria organizations use to make IS investment decisions received 85% of his responses from IS executives (Chief Information Officer, IS Manager, IS Planning Manager and IS Controller), and 13% from the Chief Financial Officer. In connection with this result, a study conducted on Kenyan commercial banks,

(Khakasa, 2009), out of 25 institutions, 23 reported that IS head's make the IS justification, whereas the remaining 2 are made by Finance Heads.

This showed that the results gained in this study follows a similar trend with studies conducted elsewhere, both internationally and regionally. However, one noticeable fact that is different in this study is, finance head are not responsible for the justification of IS investments in the case of Ethiopian commercial banks.

## 4.2. Kinds of Information System Investments

The study conducted on the types of information system investments revealed that Ethiopian banks invest in specific kinds of information system technologies. This specific kinds of information system technologies are TPS, MIS, DSS and Communication Systems. In the survey respondents were asked to provide a Yes or No response for each kinds of IS resource.

The response reveals that, out of 19 banks 19 of them have invested in transaction processing systems\TPS (Core banking systems), 18 have invested in management Information system\MIS (with only 1 not investing in this kind of information system technology), 10 have invested on decision support systems (DSS) (also called in the industry as business intelligence systems) with 9 not investing in DSS systems, in this regard 12 of the respondents have invested on communication systems, with 7 not investing in this kind of information system technology.

The survey result is summarized and provided in the below table.

*Table 7-Kind of Information System Investments by purpose*

Information System Type	'Yes'		'No'		Total Responses
	Frequency	%age	Frequency	%age	
Transaction Processing systems (TPS)	19	100%	0	0%	19
Management information system (MIS)	18	95%	1	5%	19
Decision support systems (DSS)	10	53%	9	47%	19
Executive support systems (ESS)	0	0%	19	100%	19
Expert Systems (ES)	0	0%	19	100%	19
Communication systems	12	63%	7	37%	19

*Source; own compilation of research data (2016)*

As is evident in the above summary of the study survey, of the respondents 95% of the Ethiopian banks enjoy the management information systems (MIS) which are information system technologies that serve the functions of planning, controlling, and decision making, and provide manager with reports to the organization's current performance and historical records. And 100% of these banks have the transaction processing systems, which is an information system technology that performs and records the daily routine transactions necessary to conduct business, and help managers to monitor the status of internal operations and the firm's relations with the external environment. This indicates that the two systems (MIS) and (TPS) are used to a very high extent.

The result also shows that 64.3% of the Ethiopian banks have decision support systems, the decision support systems are computerized information systems which support decisions through providing the information that help senior managers to solve the problems; and identify; evaluate and choose the best alternative solutions. Furthermore, such systems present managers with the ability of predicting the results of the alternatives that will be used in the solution.

In addition to the above information system technologies, 63% of the Ethiopian banks acquire the communication systems. Communication systems are computer-based information systems that collect, process, store, and transmit electronic messages, documents, and other forms of communications among individuals, work groups, and organizations efficiently.

In addition to the above results, the survey has revealed that Ethiopian commercial banks have not invested in two kinds of specific information system technologies, executive support systems (ESS), expert systems (ES). the two systems are; tools for the senior managers to make decisions at the strategic level and applications of artificial intelligence in businesses operation to better intelligence, respectively.

Accordingly, the results gained in this study have been compared with results of studies conducted elsewhere. In doing so, (Abdelhak & Dalel, 2008) in their study of computerized information systems investment in Jordanian banks, showed that (88.6%) of the Jordanian commercial banks enjoy the (MIS) and (82.1%) of these banks have (TPS) indicating that the two systems (MIS) and (TPS) are used to a very high extent. This result, despite the relative difference in the frequency, shows a high degree similarity with the result gained in this study in terms of result percentage size.

Moreover, (Abdelhak & Dalel, 2008) showed that (64.3%) of the Jordanian commercial banks have (DSS). This also confirms with the result gained in this study with a reasonable percentage size. Here, their study also showed that (97.3%) of the Jordanian commercial banks have acquired communication systems (E- mail, voice mail, fax), this result showed a relatively wide difference from the result gained in this study, which showed that only 63%. This indicates that, Ethiopian banks invest less on communication systems than Jordanian commercial banks.

Here, a major difference is present in regards to executive support systems (ESS) and expert systems (ES). (Abdelhak & Dalel, 2008) have learned that (61.4%) Jordanian commercial banks have invested on executive support systems and (40.7%) invested on expert systems (ES). This two information system technologies, however, were not acquired by all of the respondents in this study. This indicates that Ethiopian banks are lagging behind in regards to systems that focus on tools for the senior managers to make decisions at the strategic level and systems that make intelligent process required for conducting conclusions and inferences; and presenting suggestion and solutions for the problems in a specific field as such solutions are not understood by human experts.

To this end, (Abdelhak & Dalel, 2008) stated that the fact that investment in such type of systems, more particularly in regards to (ES) is due to the fact that such systems are a recent phenomenon even in the developed countries and that (ES's) are the most modern computer applications and they require a great amount of capital outlay and expertise.

### **4.3. Capital Budgeting Appraisal methods**

In the survey conducted to identify the capital budgeting appraisal methods used by Ethiopian banks, the frequency distributions were taken to determine the level of usage of a technique among responding institutions. For each of the approaches, banks were awarded a score of 1 if they used the approach and 0 if they did not, in a Yes or No scale. The survey results in this section of questionnaire provided the percentage of companies that used a given IS investment appraisal technique, out of the 19 banks that has responded for the study survey.

Being an indicative of the difficulty of justifying investments in IS projects on the basis of one technique or approach, all respondent banks in the survey used more than one approach to make a

decision regarding the feasibility of an IS project. Accordingly, the results are presented for each set of appraisal method in a coherent manner of presentations.

### 4.3.1. Economic Approaches

*Table 8-The Level of usage of financial appraisal methods for IS by Ethiopian Banks*

Classification	Appraisal Technique	Response	
		No of Banks Using this technique	%age of Banks using this technique
<b>Economic Approach-ratio based</b>	Payback	0	0%
	Return on Investment (ROI)	3	16%
	Cost Benefit Analysis (CBA)	3	16%
<b>Economic Approach-discounted techniques</b>	Net Present Value (NPV)	0	0%
	Internal rate of Return (IRR)	0	0%
<b>Economic Approach-future value technique</b>	Real option pricing theory	0	0%

*Source; own compilation of research data (2016)*

Only 3 of responding institutions indicated that they used at least one of the economic techniques to appraise potential IS projects. Out of this institutions 2 of them used more than one financial technique to appraise their investments.

Out of this small number of institutions using financial appraisal methods, Cost Benefit Analysis (CBA) method and Return on Investment method were the only economic technique used with 16% of usage for each. Here ratio based techniques were found to be very popular, with 16% of the respondents using them to evaluate IS projects. Besides CBA and ROI, other methods such as Payback Period, Net Present Value Internal Rate of Return Real Option Pricing Theory were not used by none of the responding banks. Overall, the limited use of financial techniques raises questions as to the extent of the use of financial criteria's, such as cash flows, to appraise potential information system projects.

The results of this study on the use of economic techniques differ with the findings of previous research on capital budgeting for general capital investments, where discounting techniques were found to be more popular than ratio-based techniques (Gitman & Forrester, 1977). In addition, this study also showed a small paternal similarity with studies in the region, (Khakasa, 2009) reported that, ration based techniques were more popular than discounting techniques.



Furthermore, this study confirms to small extent with the findings in IS literature which reveals that simple ratio techniques such as, CBA and ROI are more commonly used (Bacon, 1992; Ballantine & Stray, 1999; Small, 2006). Discounted techniques, which are gaining popularity in general capital investment appraisal, have been found to be unpopular in IS literature.

### 4.3.2. Strategic Approaches

The survey, in a very interesting pattern, indicated a strong preference for strategic appraisal techniques. The result showed that all 19 respondent banks have used strategic investment appraisal techniques to a very high degree:

*Table 9-The Level of usage of Strategic appraisal methods for IS by Ethiopian Banks*

Classification	Appraisal Technique	Response	
		No of Banks Using this technique	%age of Banks using this technique
<b>Strategic Appraisal Techniques</b>	Technical importance	19	100%
	Competitive advantage	18	95%
	Critical success factors	18	95%
	SWOT analysis	19	100%
	Application portfolio approach	5	26%

*Source; own compilation of research data (2016)*

The survey result showed that: technical arguments were used by 100% of responding banks, in a similar pattern SWOT analysis appraisal method was also used by 100% of the responding banks. The two appraisal methods are followed by competitive advantage and critical success factors, which were used by 95% of the respondents. Furthermore, the survey result showed that application portfolio approach is the list preferred strategic approach, with only 26% of the respondent affirming to have used the method.

The findings collected through this study confirm with the findings reported in previous literatures conducted elsewhere. (Bacon, 1992) Found out that 71 % of IS executives in his study highly considered the technical functionality of a potential system when making investment decisions, and 61 % used a criterion based on competition. Further confirming this result, (Khakasa, 2009) reported that, technical arguments are used by 92% of responding banks, followed by competitive

advantage 64%, critical success factors and SWOT analysis both being used by 52% of the institutions.

Moreover, (Bacon, 1992) reported that applications portfolio approach was used the least, by 40% of the respondents, also confirming with the results of this study. (Cao et al, 2006) in attempting to describe the applications portfolio approach, they reminded that the approach is a new approach which is implemented by "fitting" systems into an overall strategic structure. Thus, the limited use of this technique may be attributed to its newness as an IS investment appraisal technique.

### 4.3.3. Analytical and Integrated Approaches

In the survey, both the analytical and integrated approaches have proved to be used the least during IS investment appraisal among Ethiopian banking institutions. Of the analytical techniques that were provided for the 19 target banks of the study, only two techniques have been used to a very small extent. This appraisal techniques used by Ethiopian banks are; risk analysis, which was used by 11% of the 19 respondent banks and value analysis which were used only by 1 respondent institution.

*Table 10-The Level of usage of Analytical and Strategic appraisal methods for IS by Ethiopian Banks*

Classification	Appraisal Technique	Response	
		No of banks using this technique	%age of banks using this technique
<b>ANALYTICAL APPROACHE</b>	Scoring models	0	0%
	Computer based techniques	0	0%
	Value analysis	1	5%
	Risk analysis	2	11%
<b>INTEGRATED APPROACHES</b>	Multi-attribute utility theory*	0	0%
	Scenario planning and screening	0	0%
	Information economics	0	0%
	Balanced scorecard*	0	0%

*Source; own compilation of research data (2016)*

In this regards, out of the analytical approaches, the techniques that were not used by the respondent institutions are the computer based techniques and scoring models. This result is similar with the result reported by (Khakasa, 2009), which stated response percentage of 4%. In

addition to the two analytical methods, the result also showed that Ethiopian banks do not use all of the integrated approach; multi-attribute utility theory, scenario planning and screening, information economics or balanced scorecard.

Despite the difference in the number of firm included in the survey, these results confirms with the findings of (Small, 2006), who found out that only 6.7% of the firms in his survey of manufacturing plants in the USA conducted a Risk Analysis during investment appraisal. Other surveys on the use of investment appraisal techniques do not discuss the analysis of risk independently of other economic or integrated techniques.

In contrary to this, the result of this study differ with (Khakasa, 2009), his research identified that Risk Analysis is being used by 76% of the respondents in his survey. In addition, the results of this study also shows a major difference with the results reported by (Khakasa, 2009) which showed that Kenyan banks have used the integrated approaches with balanced scorecard being the most popular used by 56% of respondents, whereas information economics was used by 40% of respondents.

#### **4.3.4. Managerial Intuition**

To this end, a more revealing result has been the Banks response in regards to the Managerial Intuitions, here the survey showed that 74% of the 19 or 14 Ethiopian banks use managerial intuition as a criteria to apprise IS investments. Justifying this, (Small and Chen, 1995) explain that as a result of the limitations inherent in traditional investment appraisal techniques, many companies are often forced into an ad hoc approach to the justification process.

Despite this fact, the result gained in this study shows a difference from other studies, where by only 24% Kenyan banking executives responding to have relied on their “gut feelings” when appraising potential IS investments.

#### **4.4. Perceptions on Information Technology Adoption**

The perception of the respondent on the information technology adoption was collected based on two variables of perception measurements on IS adoption, taken from the instruments developed by (Moore & Benbasat, 1991). The variables were selected by making base on similar previous studies such as (Mashhour, 2008).

The respondents (19 Ethiopian banks, all providing usable responses) of the study provided an answer for each question item under the two scale variables. The responses are based on the reflection of the target respondents on the results of the IS investments made in their respective institution.

The survey results, collected through the use of a five point likert scale, was further analyzed in to descriptive statics, so as to allow for a concise presentation of responses gained.

#### 4.4.1. Relative Advantage

The relative advantage scale is developed to measure the degree to which an innovation is perceived as being better than its precursor. To this end the respondents were asked to reflect on 7 questions. The result of the survey showed a group construct mean of 4.86, taking the ordinal value of the likert scale, as provided in Table-5, shows an average response between agree and strongly agree, favoring more towards strongly agree. The descriptive statistics below provides the detail of the response for the relative advantage scale.

*Table 11-Perception of IS adoption-Relative Advantage*

Scale Name	Scale Items Description	Min	Max	Standard Deviation	Mean	Group Construct Mean
Relative Advantage	Information Technology have decreased the task execution time of users.	4	5	0.22	4.95	4.86
	Information Technology improved the quality of work.	4	5	0.31	4.89	
	Information Technology decreased difficulty of tasks.	3	5	0.52	4.79	
	Information Technology improved job performance of users.	4	5	0.22	4.95	
	Overall, I find Information Technology to be advantageous for the bank.	4	5	0.22	4.95	
	Information Technology gives greater control over work.	4	5	0.44	4.74	
	Information Technology increases the banks productivity.	4	5	0.44	4.74	

*Source; own compilation of research data (2016)*

The result was measured using the average score of the relating questions so that “1” stands for “extremely disagree” and “5” stands for “extremely agree”. In this way a higher score in these questions indicates that information systems provide a competitive advantage for banks. The

descriptive statistics showed that Ethiopian banks believe that the information system investments has made progressive benefits with high degree. This is reflected on the individual mean of each question with in the survey, which are all above 4.5 on a 1 to 5 scale. Furthermore the results showed, with small exception to decreased difficulty of task, a high degree of positive perception on the IS adoption.

The study result of this survey was compared with similar studies conducted elsewhere, in the comparison (Mashhour, 2008) reported a group construct mean of 4.1, on 1 to 7 scale, showing a difference with this study. However, the result confirms with the expectation stated by (Moore & Benbasat, 1991) claim of diffusion theory, which specifies that adopters should have more positive perceptions of information systems than non-adopters, hence, the Ethiopian banks being adopters of IS, showed a high degree of positive perception.

#### 4.4.2. Compatibility

Compatibility scale measures the degree to which an IS investment is perceived to being consistent with the existing values, needs and past expectations of the information system adopters. To this end the 19 respondent banks were supplied with 4 questions in a likert scale to show their reflection on their degree of agreement with the particular questions. In a similar manner, the results were measured using the average score of the relating questions so that “1” stands for “extremely disagree” and “5” stands for “extremely agree”. In this way a higher score in these questions indicates that the information systems investments are compatible with values, needs and past expectations of the IS adopters. Thus, the survey results have revealed a group construct mean of 4.43, showing an above agree average value.

*Table 12- Perception of IS adoption, Compatibility results*

Scale Name	Scale Items Description	Min	Max	Standard Deviation	Mean	Group Construct Mean
Compatibility	The Information Technology investment is compatible with all aspects of the banks work.	3	5	0.60	3.95	4.43
	The Information Technology adopted is compatible with the banks current organizational level.	4	5	0.44	4.26	

Scale Name	Scale Items Description	Min	Max	Standard Deviation	Mean	Group Construct Mean
	The Information Technology adopted fits well with the banks operational process.	4	5	0.41	4.79	
	The Information Technology adopted fits with the way users perform their works.	3	5	0.64	4.74	

*Source; own compilation of research data (2016)*

The descriptive statics showed that Ethiopian banks agree with the argument with that the information system investments made are compatible with their business in regards to the existing values, needs and past expectations of their institutions. This is reflected on the individual mean of each question with in the scale, which are 4 and above 4, which is the scale of “agree” on a 1 to 5 scale.

In a similar study conducted elsewhere, (Beckett, 2007) assessed the perception of teachers who used WebCAT website course and reported that compatibility scale has 5.03 group construct mean with a standard deviation of 1.25. The study was conducted on a 1 to 7 likert scale. This result, despite the scale difference shows conformity with the result of this study, as a mean value of 5.03 represents somehow agree in the scale. This studies also conforms with the diffusion theory, which states that adopters should have a positive perception on IS than non-adopters (Moore & Benbasat, 1991).

## CHAPTER FIVE

### CONCLUSION AND RECOMMENDATION

In this final chapter of the study, it is attempted to capitalize on the findings and analysis provided in chapters four. In doing so, the chapter will contain the summary of findings, conclusions drawn based on the findings and recommendations for policy makers as well as future studies is provided.

#### 5.1. Summary of Findings

In the study, new empirical evidence has been presented on the process of IS investments. More specifically, the cross-sectional survey provided an empirical evidence in regards to; what kind of IS investments are made, who justifies IS investments, how are the IS investments justified and what are the perceptions of IS investors post implementation.

To this end, the results of the study revealed that information system investments are mainly justified by heads of the information system function and to small extent by project managers. With a response rate of 16 and 3 respectively.

The study also showed the pattern of IS investments, based on the type of IS resources the investments are focused on. Accordingly it was revealed that most investments are made on; (1) transaction processing systems (100%), more specifically core banking systems and related channels of product delivery, (2) management information systems (95%); intermediary tools of information provision for management consumption in the form of reports, (3) communication systems (63%), an electrical tool for internal communications with in the institutions, (4) decision support systems (53%), advanced level tool for top level management in the form of reports.

In addition, the evidence indicated that strategic appraisal techniques appeared to be the most popular among Ethiopian banks, where high degree of usage was reported for the methods in this category; (1) technical importance and SWOT analysis being used by 100% of the respondent banks, (2) whereas, competitive advantage and critical success factors were used by 95% of the respondents. The only small exception in the strategic appraisal techniques is the relative low usage of the application portfolio approach with only 26% of the respondent's stating to have used it.

Moreover, the study investigated the perception of IS investors on the performance of their investments, where relative advantage and compatibility were used as a measure of the same. To this end the study, based on a 1 to 5 scale where high score represents high agreement, revealed a construct group mean of 4.86 and 4.43 for relative advantage and compatibility respectively.

## **5.2. Conclusions**

This section presents the conclusion drawn based on the findings of the study.

- ✓ In regards to information system justification, the study showed that IS investments are justified by head of the IS function and by the project managers. This further revealed that, head of the finance function is not involved in the IS investment justification process. The fact that only IS professionals were involved for the appraisal process, in contrary to previous studies (Gitman & Forrester, 1977; Khakasa, 2009; Irani & Love, 2002), suggests that the process is perceived as a purely technical matter, leading to the exclusion of the finance function from the process.
- ✓ As to the pattern of investment made in relation to the kinds of IS investments, it was learned that investments are focused on transaction processing systems, management information system and communication system. Whereas, indicating no particular focus was given for executive support system, which provided a set of concrete information on strategic affairs of the business.
- ✓ Moreover, in relation to the appraisal techniques employed by Ethiopian banks on potential information system investments, the study showed that strategic techniques are the overwhelming favorites among the respondents. The study also revealed that financial appraisal techniques are used to a small extent, only focusing on ratio based techniques while ignoring the cash flow approaches, indicating the lack of financial considerations from the appraisal process.
- ✓ In comparison with the above approaches, the evidence indicated a very small application of analytical and integrated appraisal techniques. This suggests the level of appraisal methods employed by the respondents lacks proper complexity.
- ✓ As to the perception of IS investors on the performance of the system post implementation. The study response showed a reasonable consistency with the diffusion theory, which states that IS adopters are expected to have a positive perception on the performance of their



system. More particularly, the respondents agree with the fact that, the IS investment provides a better performance form the banks precursors system. In addition to this the result also showed that the respondents believe the investments made are compatible with the company in terms of company strategy, business process, and employee settings.

### **5.3. Recommendation**

Based on the findings and subsequent analysis of the study, the following recommendations are forwarded as policy considerations and further future enquiry areas.

#### **5.2.1. Improvements on the Justification Process**

- Banks need to improve the justification process for information system investments by focusing on two fronts: On the composition of professionals participating in the justification process and on the appraisal techniques used for the justification.
- In regards to the composition of professionals involved in the justification process, the role should not be limited to IS function head's and project managers\consultants. Thus, the composition of professionals participating in the appraisal process should include head of the finance function. This allows for a balanced assessment of investments based on a multitude of criteria's, more particularly; economic, strategic and integrated approaches.
- In addition to the composition of the apprising team, focus should be given to the techniques employed in the appraisal process. This should be done in respect to financial and integrated approaches, which has the capacity to show the financial impact and feasibility of the prospective IS investments from multiple arrays.

#### **5.2.2. Considerations for Investment Emphasis**

- In addition to the types of information systems currently focused on by Ethiopian banks, consideration should be made towards additional IS technologies that will bring important addition to the business. This are, Executives Support Systems and Expert systems.
- Executive support systems will enable the top management of the bank to acquire the proper level of strategic information with minimal effort. In turn this will lead to better strategic success to banks, by allowing the executive management to make informed proactive decisions.

- In addition to the executive support systems, Ethiopian banks should consider the employment of expert systems that will assist in the data mining and business solution provision functions. As such systems are the future of business intelligence, internationally competent standards would not be attained without a state of the art technological progress.

### **5.2.3. Suggestions For Future Studies**

The prime objective of this study is to investigate the information system investments appraisal process with in the Ethiopian banks sector. In doing so, the Justification process along with the, who and what of such process were examined.

In this regard, the findings in this thesis could be strengthened and expanded by replicating the study at different point in time and in other industries. Future researchers may also investigate causes and effects of adopting different combinations of appraisal techniques. This may help develop the understanding levels of using different investment appraisal techniques for IS investments.

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# APPENDIX

## Appendix-1-Row Data- A

<b>Name of Institution</b>	<b>IS Appraisal Responsibility</b>	<b>Transaction Processing systems (TPS).</b>	<b>Management information system (MIS)</b>	<b>Decision support systems (DSS)</b>	<b>Executive support systems (ESS)</b>	<b>Expert Systems (ES)</b>	<b>Communication systems</b>
<b>AB</b>	Information System	Yes	Yes	Yes	No	No	Yes
<b>AdIB</b>	Information System	Yes	Yes	No	No	No	No
<b>AIB</b>	Information System	Yes	Yes	Yes	No	No	Yes
<b>BOA</b>	Project Management	Yes	Yes	No	No	No	Yes
<b>BeIB</b>	Information System	Yes	Yes	Yes	No	No	Yes
<b>BIB</b>	Information System	Yes	Yes	No	No	No	Yes
<b>CBE</b>	Project Management	Yes	Yes	No	No	No	Yes
<b>CBB</b>	Information System	Yes	Yes	No	No	No	Yes
<b>CBO</b>	Information System	Yes	Yes	Yes	No	No	No
<b>DB</b>	Project Management	Yes	Yes	Yes	No	No	Yes
<b>DGB</b>	Information System	Yes	Yes	No	No	No	No
<b>DBE</b>	Information System	Yes	Yes	Yes	No	No	Yes
<b>EB</b>	Information System	Yes	No	Yes	No	No	No
<b>LIB</b>	Information System	Yes	Yes	No	No	No	No
<b>NIB</b>	Information System	Yes	Yes	Yes	No	No	Yes
<b>OIB</b>	Information System	Yes	Yes	No	No	No	Yes
<b>UB</b>	Information System	Yes	Yes	Yes	No	No	Yes
<b>WB</b>	Information System	Yes	Yes	No	No	No	No
<b>ZB</b>	Information System	Yes	Yes	Yes	No	No	No

*Source: Compilation of Survey Data (2016)*

## Appendix-2-Row Data B

Name of Institution	AB	AdIB	AIB	BOA	BeIB	BIB	CBE	CBB	CBO	DB	DGB	DBE	EB	LIB	NIB	OIB	UB	WB	ZB
<b>Payback</b>	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
<b>Return on Investment (ROI)</b>	No	No	No	No	No	No	Yes	No	No	No	No	Yes	No	No	No	No	Yes	No	No
<b>Cost Benefit Analysis (CBA)</b>	No	No	No	No	No	No	Yes	No	No	Yes	No	Yes	No	No	No	No	No	No	No
<b>Net Present Value (NPV)</b>	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
<b>Internal rate of Return (IRR)*</b>	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
<b>Real option pricing theory</b>	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
<b>Technical importance</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Competitive advantage</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
<b>Critical success factors</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>SWOT analysis</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Application portfolio approach</b>	No	No	No	No	No	No	Yes	Yes	No	No	No	Yes	Yes	No	No	No	Yes	No	No
<b>Scoring models</b>	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
<b>Computer based techniques</b>	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
<b>Value analysis</b>	No	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No
<b>Risk analysis</b>	No	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No	Yes
<b>Multi-attribute utility theory*</b>	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
<b>Scenario planning and screening</b>	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
<b>Information economics</b>	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
<b>Balanced scorecard*</b>	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
<b>Gut feeling</b>	No	No	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes

*Source; Compilation of Survey Data (2016)*

### Appendix-3-Row Data C

Name of Institution	Q 30.	Q 31.	Q 32.	Q 33.	Q 34.	Q 35.	Q 36.	Q 37.	Q 38.	Q 39.	Q 40.
<b>AB</b>	5	4	3	5	5	4	5	3	4	4	3
<b>ADIB</b>	5	4	4	5	5	4	4	4	4	5	4
<b>AIB</b>	5	5	5	5	4	5	5	4	4	5	5
<b>BOA</b>	5	5	5	5	5	4	4	4	4	4	5
<b>BIB</b>	5	5	5	4	5	4	4	5	4	5	5
<b>BUIB</b>	5	5	5	5	5	5	5	4	5	4	5
<b>CBE</b>	5	5	5	5	5	5	5	5	5	5	5
<b>CBB</b>	5	5	5	5	5	5	5	4	5	5	5
<b>CBO</b>	5	5	5	5	5	4	4	5	5	5	5
<b>DB</b>	5	5	5	5	5	5	5	4	4	5	5
<b>DGB</b>	5	5	5	5	5	5	5	4	4	5	5
<b>DBE</b>	5	5	5	5	5	5	5	3	4	5	5
<b>EB</b>	4	5	4	5	5	5	4	4	4	4	3
<b>LIB</b>	5	5	5	5	5	5	5	4	5	5	5
<b>NIB</b>	5	5	5	5	5	5	5	3	4	5	5
<b>OIB</b>	5	5	5	5	5	5	5	4	4	5	5
<b>UB</b>	5	5	5	5	5	5	5	4	4	5	5
<b>WB</b>	5	5	5	5	5	5	5	4	4	5	5
<b>ZB</b>	5	5	5	5	5	5	5	3	4	5	5
<b>Min</b>	4	4	3	4	4	4	4	3	4	4	3
<b>Max</b>	5	5	5	5	5	5	5	5	5	5	5
<b>Standard Deviation</b>	0.22	0.31	0.52	0.22	0.22	0.44	0.44	0.60	0.44	0.41	0.64
<b>Mean</b>	5	5	5	5	5	5	5	4	4	5	5

Source; *Compilation of Survey Data (2016)*

## Appendix 4- Survey Questionnaire

**Addis Ababa University**  
**College of Business and Economics**  
**Department of Accounting and Finance**  
Survey Questionnaire

Dear respondent,

This survey is conducted with the intention to provide insight into the practice of Information Technology investment evaluation in the Ethiopian banking sector. The results of the survey will be used to develop industry-wide benchmarks on investment evaluation. Thus, results will help practitioners to make more informed decisions on future IT investments and resource commitments.

The researcher is a candidate for degree of MSC in Accounting and Finance at Addis Ababa University College of Business and Economics.

All data and information that is gathered through this questionnaire will be used for the sole purpose of the research and remains confidential. Therefore, you are kindly requested to respond to the questions freely, in good faith and to the best of your knowledge. There is no need to write your name on the questionnaire.

Thank you in advance for your time and kind cooperation.

### **I. General Profile**

Please use the blank space for question requiring your exact answer and for the rest of questions put a  $\surd$  or X mark in the selection box that best represents your response.

1. Name Of the Institution \_\_\_\_\_

2. Respondents Responsibility.

- |                                                         |                                               |
|---------------------------------------------------------|-----------------------------------------------|
| <input type="checkbox"/> Information Systems            | <input type="checkbox"/> Financial Management |
| <input type="checkbox"/> Consultancy/Project Management | <input type="checkbox"/> _____                |



## II. Type of Information System Technology Investments

Kindly place a (√ or X) mark by identifying whether the specific list of information system types are acquired or not by your institution. You may use “Yes” column if the IS type has been acquired by your institution, or place a mark on the “No” column if not acquired. In addition you may specify any type of information system your firm may have invested on, in the “other if any”, section of the questioner.

No.	Information System Type	Explanatory Note	Response	
			Yes	No
3.	Transaction Processing systems (TPS).	Are the basic business systems that serve the operational level of the organization. A transaction processing system are a computerized system that performs and records the daily routine transactions necessary to conduct business. <i>Examples</i> are sales order entry system, hotel reservation systems, and payroll.		
4.	Management information system (MIS)	Serve the management level of the organization, providing managers with reports and often online access to the organization's current performance and historical records.		
5.	Decision support systems (DSS)	Decision support systems are computerized systems that serve the management level of the organization and help managers make decisions.		
6.	Executive support systems (ESS)	Executive support systems are computer-based information systems which serve the strategic level of the organization, and help senior managers to make decisions.		
7.	Expert Systems (ES) (	Expert Systems are an applications of artificial intelligence in businesses such as the development of expert systems and other business intelligence systems.		

No.	Information System Type	Explanatory Note	Response	
			Yes	No
8.	Communication systems (CS): (i.e E mail, Voice- mail, fax)	Are computer-based information systems that collect, process, store, and transmit electronic messages, documents, and other forms of communications among individuals, work groups, and organizations efficiently.		

9. Others, If any?

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### III. INFORMATION SYSTEM TECHNOLOGIES INVESTMENT EVALUATION CRITERIA

Excluding routine maintenance costs, operating costs, user support costs and administrative costs, which of the following methods, criteria, or justification does your institution use in making the basic go-ahead decision on IS/IT investments (IS acquisitions, development and upgrading projects, computer hardware, software or telecommunication facilities, outsourcing contracts)? Please place a tick mark, as applicable in the column to the right of the table.

No.	Classification	Appraisal Technique	Explanatory Note	Response	
				Yes	No
10.	ECONOMIC APPROACHES (ratio based)	Payback	Compute the time required to recover the initial cost		
11.		Return on Investment (ROI)	Computes the expected profit from the IT investment.		

No.	Classification	Appraisal Technique	Explanatory Note	Response	
				Yes	No
12.		Cost Benefit Analysis (CBA)	Financial costs and benefits (direct and indirect) are considered and quantified to assess the net worth of the investment.		
13.	Economic approach (discounting techniques)	Net Present Value (NPV)	Expected costs and revenues of the project are quantified and discounted to present value using proper discounting methods to determine the current benefit of implementing the project.		
14.		Internal rate of Return (IRR)*	Calculates the rate of return for an investment, in which the present value of cash inflows are balanced against the present value of outflows.		
15.	Economic approach (future value technique)	Real option pricing theory	Calculate the additional value of an investment that exists because it provides the option for a second subsequent investment. Investing in one type of IS/IT may provide the option of investing in another type; thus the additional value of this option is considered in the evaluation of the original investment.		
16.	STRATEGIC APPROACHES	Technical importance	Projects selected on the basis of the technical functionalities of the potential information system.		
17.		Competitive advantage	The impact of the potential IS/IT investment on the competitive positioning of the institution are considered before the decision.		
18.		Critical success factors	The impact of potential IT projects on key performance indicators is determined, and the project selected on this basis.		
19.		SWOT analysis	An analysis of the IS/IT project's Strengths and Weaknesses, Opportunities and Threats is conducted before the decision.		

No.	Classification	Appraisal Technique	Explanatory Note	Response	
				Yes	No
20.		Application portfolio approach	Potential IS/IT investments are fitted into the existing collection of IS/IT, and the overall strategic structure. Business strategy, information system provision and information technology support are considered in the analysis.		
21.	ANALYTICAL APPROACHE	Scoring models	This technique enables decision makers to experiment with various alternative decisions and assess the impact of each alternative on business performance for investments that are expected to yield intangible and/or indirect benefits such as IS/IT investments.		
22.		Computer based techniques	Involves analytic formulations with computer generated numerical solutions and different programming techniques. An example is Fuzzy logic systems, whose rules resemble the Following: 'if this set of criteria is satisfied, in combination, to a given degree, then take.		
23.		Value analysis	Based on making value-costs assessments of proposed IT investments. Involves prototyping and surveying to determine the value of benefits of an IT investment. An IT prototype is proposed, its costs determined, and potential benefits identified, valued and compared to the costs.		
24.		Risk analysis	The 'service' value of potential IS/IT investments is identified, the threats to which the IS/IT project might be exposed, and the vulnerability of those projects to the threats identified.		
25.	INTEGRATED APPROACHES	Multi-attribute utility theory*	Integrated approach where strategic operational and financial decisions are integrated while evaluation potential IS/IT projects		

No.	Classification	Appraisal Technique	Explanatory Note	Response	
				Yes	No
26.		Scenario planning and screening	Involves testing the potential IS/IT investment against a series of alternative future occurrences. While considering the potential IS/IT investment, flexible long-term plans are made based on its expected impact, and the most favorable is selected.		
27.		Information economics	This scoring approach to cost/benefit analysis assesses technical and tangible and intangible benefits and costs expected by the introduction of the new IS/IT. Considers business factors such as strategic match, competitive advantage, management information support, competitive response and project and organizational risk and technical factors such as strategic IS architecture and IS infrastructure risk.		
28.		Balanced scorecard*	This technique balances measures of financial performance, internal operations, innovation and learning, and customer satisfaction during IS/IT project appraisal. During project appraisal, strategic objectives of the potential IS/IT are linked to a comprehensive range of key performance indicators		
29.	Managers Intuition	Gut feeling	No formal analysis is conducted. Decisions Gut feeling based on personal feelings about potential investments.		

#### IV. Information System Investment Added values Assessment

Please indicate your degree of agreement or disagreement with the statements provided here under, by putting  $\surd$  or X marks in the appropriate column as best represents you each column represents (1-Strongly Disagree; 2-Disagree; 3- Neutral; 4-Strongly Agree; 5-Agree).

Key: SD= Strongly Disagree; D=Disagree; N= Neutral; A= Agree; SA= Strongly Agree

No.	Variables	Scale				
		SD	D	N	A	SA
	<b>IT Relative Advantage</b>					
30.	Information Technology have decreased the task execution time of users.					
31.	Information Technology improved the quality of work.					
32.	Information Technology decreased difficulty of tasks.					
33.	Information Technology improved job performance of users.					
34.	Overall, I find Information Technology to be advantageous for the bank.					
35.	Information Technology gives greater control over work.					
36.	Information Technology increases the banks productivity.					
	<b>Compatibility</b>					
37.	The Information Technology investment is compatible with all aspects of the banks work.					
38.	The Information Technology adopted is compatible with the banks current organizational level.					
39.	The Information Technology adopted fits well with the banks operational process.					
40.	The Information Technology adopted fits with the way users perform their works.					