INFORMATION SYSTEMS SUCCESS AND EXPECTATIONS FOR INFORMATION TECHNOLOGY INVESTMENT: CASE STUDY

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Approval of the Graduate School of Informatics

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ABSTRACT

INFORMATION SYSTEMS SUCCESS AND EXPECTATIONS FOR INFORMATION TECHNOLOGY INVESTMENT: CASE STUDY

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In this thesis, information systems success measurement practices and expectations for information technology investments of four companies in Turkey are examined. The aim of this study is to understand the information systems success measurement practices of the studied companies and the relation between the expectations for IT investment and IS success of these companies in Turkey.

Keywords: IS Success, Expectations for IT Investment

ÖZ

BİLİŞİM SİSTEMLERİ BAŞARISI VE BİLİŞİM TEKNOLOJİLERİ YATIRIMI BEKLENTİLERİ: ÖRNEK OLAY İNCELEMESİ

Güvence, Çağrı Işık

Yüksek Lisans, Bilişim Sistemleri Bölümü

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Bu tezde Türkiye'deki dört firmanın bilişim sistemleri başarı ölçümü uygulamaları ve bilişim teknolojileri yatırımı beklentileri incelenmektedir. Bu çalışmanın amacı örnek firmaların bilişim sistemleri başarısı ölçüm uygulamalarını ve bilişim teknolojileri yatırımı beklentilerinin bilişim sistemleri başarısı ile ilişkisini anlamaktır.

Anahtar Kelimeler: Bilişim Sistemleri Başarısı, Bilişim Teknolojileri Yatırım Beklentileri

To my big family

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LIST OF ABBREVIATIONS

CMM: Capability Maturity Model

EBIT: Earning Before Income Taxes

IEEE: Institute of Electrical and Electronics Engineers

IS: Information System

IT: Information Technology

ROI: Return on Investment

SLA: Service Level Agreement

CHAPTER 1

INTRODUCTION

The importance of measuring information systems success increases as the investments in information systems increase. In order to justify information systems' investments, organizations need assessing the success of their information systems. The importance of IS success in organizations has caused many researchers to study this subject. The researchers developed many frameworks and models in order to evaluate the success of information systems. However, measuring information systems success is a difficult issue both for organizations and researchers. This is caused by the nature of the information systems. Information systems have many factors to be considered when measuring the success of the information systems. These factors include technological, human and organizational aspects. Moreover, since it is very difficult to isolate individual factors from those, which contribute to the organization's productivity, competitiveness, etc., it is very difficult to measure the contributions of information systems to organizations. Hence, managers have to face the difficult task of deciding to invest in information systems. It is a difficult task because it is very difficult to justify the investments of information systems, which require big budgets of the organizations, and, after the implementation of the investment, it is very difficult to isolate and measure the contribution of information systems from the other contributors.

The aim of this thesis is to understand the information systems success measurement practices of the selected companies. Moreover, the aim is to understand the relation between information technology investment expectations and information systems success of the selected companies.

1.1) RESEARCH QUESTIONS

The research questions are: "How are the selected companies' practicing measurement processes of their information systems success?" and "How are the selected companies' expectations for information technology investment related with their information systems success?"

1.2) OUTLINE OF THE THESIS

This thesis is composed of five chapters. In Chapter 2, literature survey is presented for three major issues: IS success models, expectations for IT investment and qualitative research. In IS success model section, various IS evaluation models are examined. The section on expectations for IT investment starts with the definition of IT and continues with the concept of expectation in the literature. An Expectation Model is introduced in this section. Lastly, the qualitative research principles are reviewed. Also, the case study technique is explained in the qualitative research section. Qualitative research method is compared to quantitative research method and rationale behind the usage of qualitative research method in this thesis is explained.

In Chapter 3, the details of the companies selected for the case study are given. The reasons for selecting these companies are explained in this chapter.

In Chapter 4, the research questions are discussed. The findings are analyzed according to these research questions in this chapter. Validity of the research is examined and how the main threats to the validity of the research are handled in this study is explained. Lastly, the limitations of the research are reviewed in this chapter.

In Chapter 5, the findings of the study stated in Chapter 4 are summarized. Main results of the thesis and future research opportunities are discussed in this chapter.

CHAPTER2

LITERATURE REVIEW

In this chapter, the literature on information systems success, expectations for information technology and qualitative research methodology will be discussed.

2.1) INFORMATION SYSTEMS SUCCESS

2.1.1 DEFINITION

INFORMATION SYSTEMS

Laudon and Laudon (1998) define information systems as a set of interrelated components, which collect, process, store and distribute information in an organization. On the other hand, Hirschheim, Klein, Hague and Lyytinen (1995) express the importance of human factor in information systems and define information systems as:

"Tradionally, an information system has been defined in terms of two perspectives: one relating to its function; the other, to its structure. From a structural perspective, an information system consists of a collection of people, process, data, models, technology and partly formalized language, forming a cohesive structure, which serves some organizational purpose or function. From a functional perspective, an information

system is a technologically implemented medium for the purpose of recorded, storing, and disseminating linguistic expressions as well as for the supporting of inference making. Through performing these elementary functions, IS facilitate the creation and the exchange of meanings that serve socially defined purposes such as control, sense-making, and argumentation (i.e. the formulation and justification of claims). In either of these two perspectives on information systems, it should be noted that humans are included within its boundaries which means that the services provided by an IS in part depend upon human capabilities and contributions."(pg.11)

INFORMATION SYSTEMS SUCCESS

According to Bedell (1985, cited in Hoogeveen and Oppelland, 2002) information systems success is both the user's satisfaction with the functionality of the system and the data output and the importance of high technical quality and cost effectiveness. He argues that if the information system is functionally appropriate, cost effective and provides high technical quality, this information system can be called an effective information system (Bedell 1985, cited in Hoogeveen and Oppelland, 2002).

Information systems success, IS effectiveness, IS evaluation, IS assessment are commonly used terms in the literature based on their published area. All these terms refer to measuring value of information systems. Seddon, Bowtell, Patnayanuki and Staples (1997) defined information systems effectiveness as:

"An information system is "effective" if the person or organization that expended resources in acquiring, building, learning to use, and/or using the system is better off as a result."(pg.168)

In the light of these definitions, information systems success measurement issue will be discussed in the next section.

2.1.2 INFORMATION SYSTEMS SUCCESS MEASUREMENT

Information systems success measurement has always been a difficult task to accomplish (Scott, 1995; Kappelman, Myers and Prybutok, 1997; Willcocks and Lester, 1997; Serafeimidis and Smithson, 2000; Lycett and Giaglis, 2000). Major limitation in IS success measurement is that there is no "one" measure (Willcocks and Lester, 1997). There are many measures which can be used for measuring IS success. Moreover, there is no "one" model to assess IS success. Each measure should be unique to the organization (Seddon, Graeser and Willcocks, 2002; DeLone and McLean, 1992).

In the last decade, IS success measurement has become an important topic for organizations. Organizations spend vast amount of money for their information systems. This money amount holds one of the biggest percentages of these organizations' budgets. Therefore, managements expect benefits from these investments in return. In other words, managements need an approval to make huge investments in IS as well as managements want to justify their expenditure on IS. Lycett and Giaglis (2000) argue that managers need to understand the impacts of IS investments on organizational performance. They add that evaluation of IS success gives both a simple managerial feedback and benchmark. The feedback supports the organizational learning and the benchmark can be used as a measure for the later IS projects successes. As a result of evaluation efforts created hundreds of article in the literature. However, still measuring IS success stands as a difficult question.

Among huge measurement methods and measures, still it is possible to group measurement efforts and measures into major classes. For example, Seddon et al. (2002) argue that measures fall into two groups. The first one's major focus is on views of users of information systems. Some of these measures are user satisfaction, information quality, perceived usefulness, and user productivity. Seddon et al. (2002) put these measures into "individual as stakeholder" category. The second group is composed of return on investment, return on management, cost savings, sales growth, and system

availability. This second group, which Seddon et al. named as “management or owner as stakeholders” focuses on views of managers.

According to Ginzberg (1981), measuring success of information systems depends on the definition established for success. The definition of success can be measured with both attitudinal and behavioral measures. Some of the attitudinal measures are: user satisfaction, level of use, client reaction. Some of the behavioral measures are: connection time, number of sessions and frequency of functions executed.

According to Smithson and Hirschheim (1998, cited in Lycett and Giaglis, 2000) define “levels” and “zones” of information systems evaluation. The first one ranges from macro-economic to individual stakeholders. The latter one contains efficiency, effectiveness, and understanding.

According to Islei, Harvey and Willcocks’ survey (1996, cited in Willcocks and Lester, 1997), although two thirds of the surveyed organizations are skeptic at demonstrating IT effectiveness, organizations tend to evaluate IS success in two area. The first area is the assessment of performance, mostly in terms of technical efficiency or project evaluation. The second area is the assessment of business related performance of IS/IT and the frequent measure of this area is customer/user satisfaction. According to McGuire and McKeown (2000) service level agreement (SLA) is an important measurement tool for information systems projects. By establishing the volume, quality and cost of the work that will be delivered, service provider commits to the customer with the components of a SLA. Then it is possible to measure the success of the information systems by comparing the actual performance of the project and the SLA commitments (McGuire and McKeown, 2000).

Classifying measurement methods and measures makes not easier to measure IS success. Therefore, it is common to see new search needs emerging and to see shifts in the IS success measurement approaches. Theoreticians move away from a positivistic approach

towards a more interpretive approach (Serafeimidis and Smithson, 2000). This argument approves the argument of van Nievelt (1992, cited in Willcocks and Lester, 1997) that he believes macroeconomic studies of IT productivity can mislead, and that microeconomic studies of how individual organizations and markets behave are altogether more helpful.

From these arguments it can be concluded that studying organizations' practices can teach more. Unlike developing a unique model to implement, and since IS is a continual process and it is prone to new changes in the real world, accumulated information gathered from the existing practices will help understanding IS success better.

Nevertheless, without a unique model search, IS success measurement efforts would have remained immature. Therefore, the literature review continues with the IS success measurement models through timeline.

2.1.3) INFORMATION SYSTEMS SUCCESS MEASUREMENT MODELS

2.1.3.1) INFORMATION SYSTEMS SUCCESS: THE QUEST FOR THE DEPENDENT VARIABLE (DELONE AND MCLEAN, 1992)

When the issue is about information systems success, it is impossible to think the literature without DeLone and McLean's (1992) information systems success model. This model has six dimensions:

- System Quality: This dimension includes the measures of the information processing system itself. Some of these measures are:
    - Flexibility of system
    - Integration of systems
    - Response time
    - Realization of user requirements

- System reliability
- Ease of use
- Ease of learning
- System accessibility

As it is understood from the above, these measures are system performance related measures.

- Information Quality: This dimension includes the measures that measure the quality of the output produced by information system. Some of these measures are:
  - Accuracy
  - Precision
  - Currency
  - Timeliness
  - Reliability
  - Completeness
  - Conciseness
  - Format
  - Understandability
  - Relevance

- Information Use: This dimension that is the most criticized dimension after this model published. Why it is the most problematic dimension will be discussed later in this chapter. This dimension includes the measures that measure the use of the information system. Some of these measures are:
  - Motivation to use
  - Frequency of use
  - Frequency of voluntary use

- User Satisfaction: This dimension includes the measures that measure the user satisfaction from the output of the information system. Some of these measures are:
    - Software satisfaction
    - Hardware satisfaction
    - Enjoyment
    - User information satisfaction
    - Overall satisfaction

- Individual Impact: This dimension measures try to measure the effect of the information system on the user. Some of these measures are:
    - Interpretation accuracy
    - Decision quality
    - Time taken to complete a task
    - Time to reach decision
    - Learning
    - Willingness to pay for information

- Organizational Impact: This dimension includes the measures that measure the effect of the information system on the organization. Some of these measures are:
    - Increased revenue
    - Return on investment
    - Service effectiveness
    - Cost reduction
    - Increased work volume
    - Contribution to achieving goals
    - Product quality

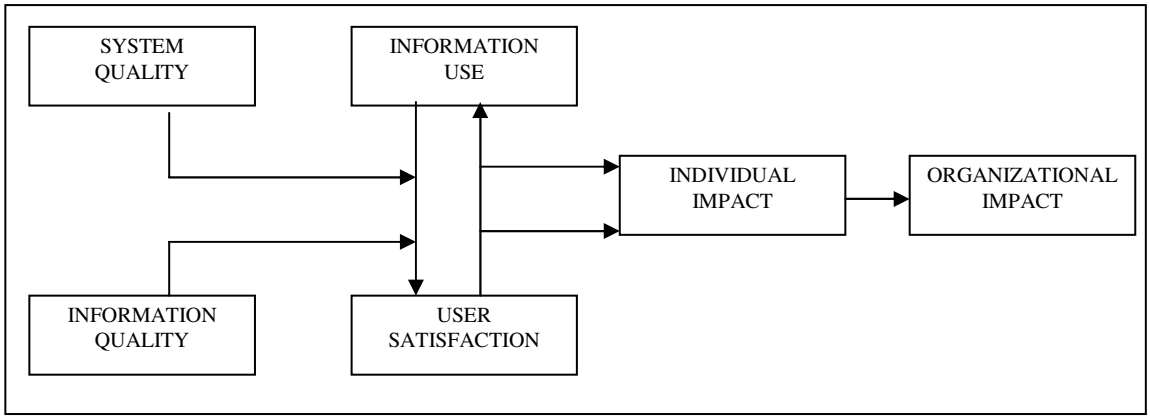

Figure 1 DeLone and McLean's IS Success Model (1992)

From Figure 1, DeLone and McLean (1992) describe success as a process, which is interdependent including the serial, temporal dimension of information flow and impact. Both *use* and *user satisfaction* are affected by s*ystem quality* and *information quality* alone and jointly. Moreover, both the amount of *use* and the degree of *user satisfaction* affect each other positively or negatively. *Use* and *user satisfaction* directly affect *individual impact,* which has effect on *organizational impact*.

This model has been widely accepted and implemented for further information systems research. However, like any other models, this model has been criticized, also. Seddon et al. (1997) published an article named "A Re-Specification of the DeLone and McLean Model of IS Success". In this article, it is argued that one of the dimensions of DeLone and McLean's IS Success Model, *IS use* dimension creates vague. According to the article, *IS use* dimension creates confusion because it has three different meanings:

1. *IS use* is used as benefits from use. It is argued that, benefits from use have the similar meaning of i*ndividual impact* and o*rganizational impact* that makes *IS use* dimension useless.
2. *IS use* is used as a dependent variable that predicts future *IS use*. It is argued that dimension's usage in this meaning stands for behavior description not for IS success measure. As far as this meaning is concerned, *IS use* dimension is also useless.

3. *IS use* is used as the consequences of *use*. It is argued that third meaning of *IS use* is used as *user satisfaction*, *individual impact*, and o*rganizational impact* instead of IS success measure. Therefore, this meaning of *IS use* is not needed to be represented as *IS use*.

These three meanings cause *IS use* dimension to be dropped from the model. Only one case, which may necessitate the use of *IS use* dimension is voluntary use of similar systems by similarly skilled users. It is argued that, if this case happens, *IS use* dimension is used as IS success. Other than this case, *IS use* has no place in IS Success Model. Hence, the DeLone and McLean's (1992) model needs to be revised. Therefore, Seddon (1997) has come up with a re-specified model of IS success.

In Figure 2, the model has two parts. The part on the right of the figure is IS success measurement part. And the part on the upper, in the rounded boxes, shows behavioral part of the re-specified model. In this model, two new variables are introduced and all three meanings of *IS use* are used. *IS use* is used as a behavior not as an IS success measure. Perceived usefulness variable is used as first meaning of *IS use*. Expectations about the net benefits of future *IS use* is used as the second meaning of *IS use*. In this behavioral part, it is assumed that higher levels of expectations cause higher levels of *IS use*. The third meaning of *use* is the link between *IS use* and *impacts*. It is argued that by this model, *IS use* meaning has been clarified.

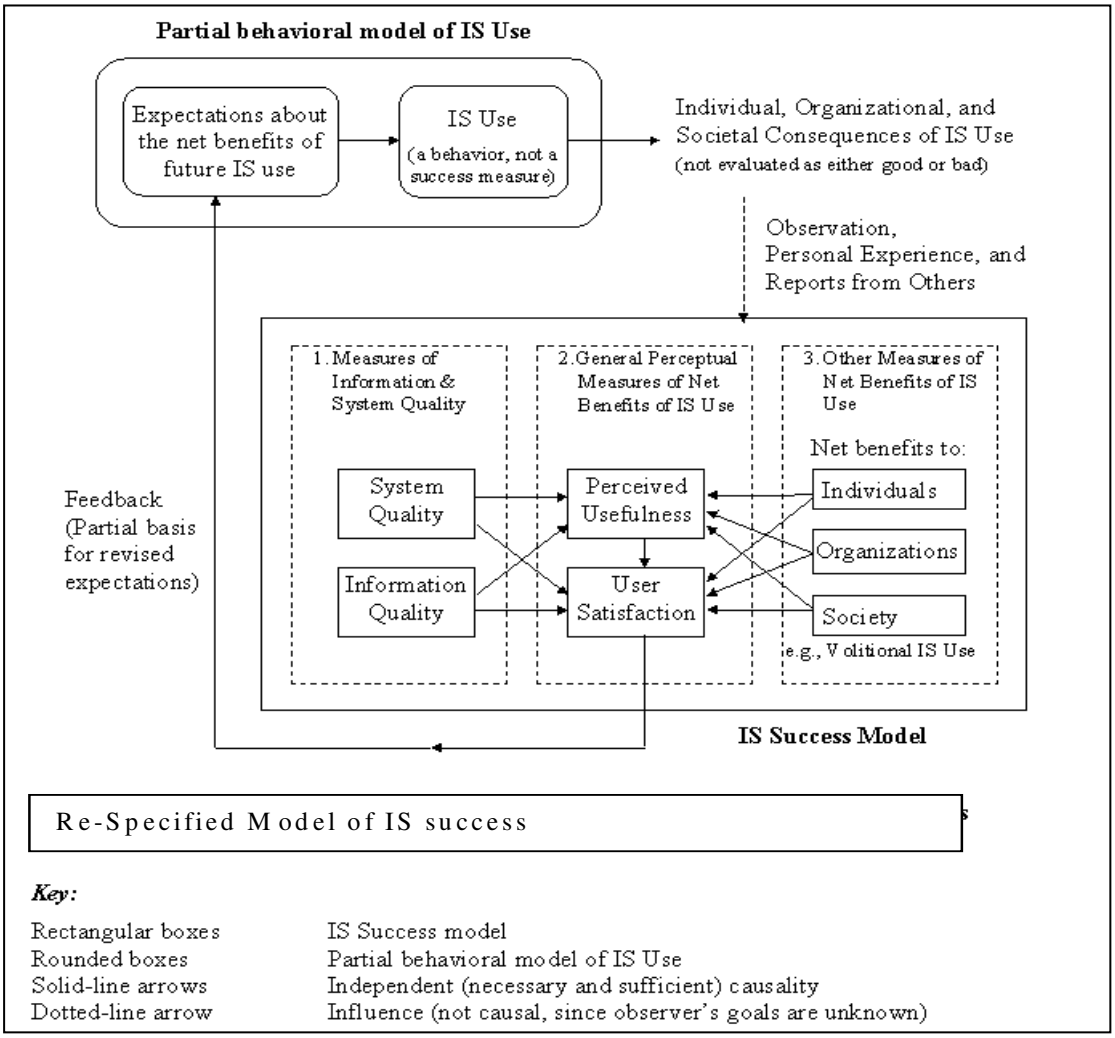

Figure 2 Seddon's Re-Specified version of DeLone and McLean's (1992) Model of IS Success (1997)

2.1.3.2) MEASURING PERFORMANCE OF THE INFORMATION SYSTEMS FUNCTION (SAUNDERS AND JONES, 1992)

According to Saunders and Jones (1992), "IS function" term represents all IS groups and departments in the organization.

Saunders and Jones (1992) argue that managers are interested in IS functions' operations, efficiency of the operations and problems of the operations. Turn around time, machine reliability, meet project deadlines, cost savings, ROI and system availability are the traditional measures for measuring IS functions' operations. However, Saunders and Jones add that the traditional measures are far from evaluating "soft" benefits of IS function such as stronger strategic advantage, increase in flexibility, improved decision making.

Literature review necessitated Saunders and Jones to focus on ten dimensions of IS performance measures. These dimensions are:

- IS contribution to organizational financial performance
- IS operational efficiency
- Adequacy of system development practices
- User/Manager attitudes
- IS staff competence
- IS personnel development
- Integration of IS and corporate planning
- Quality of information outputs
- IS impact on strategic decisions
- Integration with related technologies across other organizational units

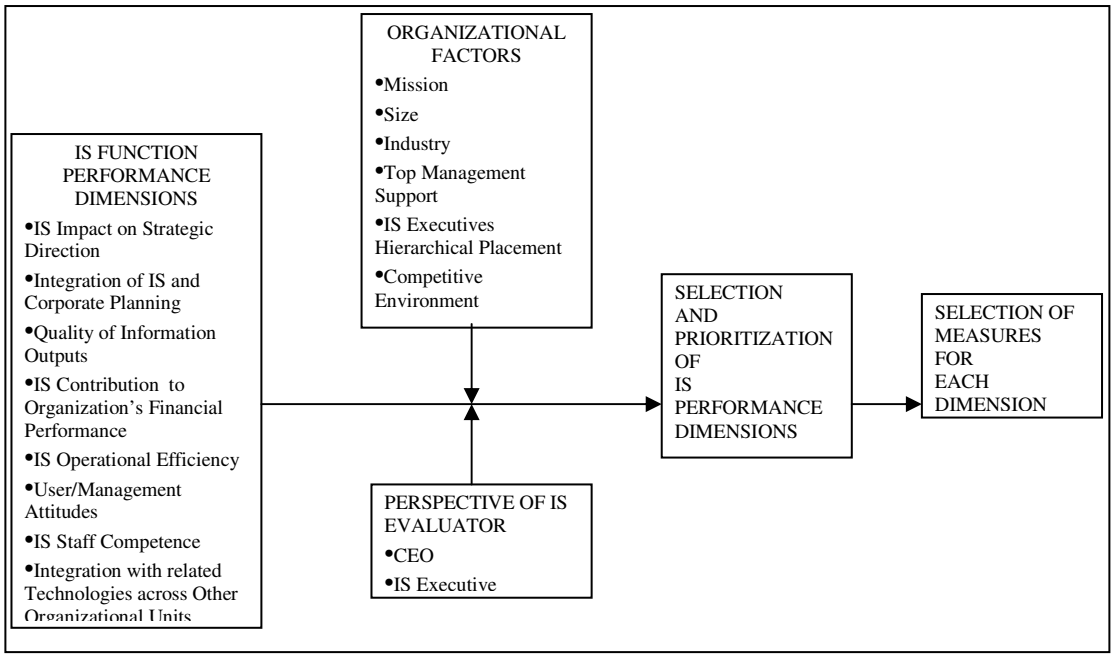

Figure 3 IS Function Performance Evaluation Model (Saunders and Jones, 1992)

It can be understood from Figure 3 that dimensions selection must be based on organizations' values and assessment making individuals' preferences. In other words, both organizational factors and evaluators affect the prioritization of performance dimensions.

In order to understand the ranking importance of IS function performance dimensions, Saunders and Jones did a delphi study with IS executives. According to the study, rankings of IS performance dimensions and their measures are:

1. IS impact on strategic decisions
    - Market share increase
    - Profit increase
    - Organization would be out of business without IS

2. Integration of IS and corporate planning
    - IS documented plan designed to support the corporate strategic plan

- Forecasts of IS capabilities exist
- Corporate and IS plans jointly developed

3. Quality of information outputs
    - End-user surveys
    - Customer/client surveys
    - Log of errors encountered by users maintained

4. IS contribution to organizational financial performance
    - Return on investment
    - Return on assets
    - Cost allocation
    - Value added (return on management)
    - Industry average comparison of IS budgets as a percentage of revenue
    - Budget performance (ability to meet IS budgets)
    - Cost of maintaining systems

5. IS operational efficiency
    - Log of system availability
    - Users' perceptions surveys
    - User turnaround time (batch)
    - Log of computer and communication up/down time
    - System response time (on line)

6. User/Manager attitudes
    - Management and user perceptions of IS performance
    - User surveys of user participation in systems development
    - User surveys of IS responsiveness to user needs
    - Time for IS function to respond to user complaints
    - Complaint logs

7. IS staff competence
    - Number of managerial and technical education programs for IS staff
    - Career ladder for IS staff exist
    - Formal performance appraisal system used
    - Level of education of IS staff

8. Integration with related technologies across other organizational units
    - User/IS development of user/IS budget

9. Adequacy of system development practices
    - Percentage of projects completed on time and /or within budget
    - Standard methodology for system analysis and design exists
    - Evaluation of user and IS function documentation is performed
    - Estimates of number of man-years in backlog of system development requests

10. Ability of IS function to identify and assimilate new technologies
    - Formal reward system for innovative thinking and suggestions using IT
    - Number of technical breakthroughs

Result of the study shows that unlike literature review findings, IS executives think that "Ability of IS function to identify and assimilate new technologies" dimension is more important than "IS personnel development". Moreover, study findings reveal that IS executives have a different importance ranking of performance dimensions than theoreticians such as "IS impact on strategic decisions" ranks higher than "IS contribution to organizational financial performance".

2.1.3.3) IS EFFECTIVENESS MATRIX: THE IMPORTANCE OF STAKEHOLDER AND SYSTEM IN MEASURING IS SUCCESS (SEDDON ET AL., 1997; SEDDON ET AL., 1999)

Seddon et al., (1997) argue that different types of IS effectiveness measures should be used because the IS effectiveness measures are imperfect and different measures are needed for different stakeholders and different types of IT investments. Therefore, they come up with a new IS effectiveness matrix (1997). Seddon et al., (1999) argue that the purpose of this two-dimensional matrix is to classify IS effectiveness measures. The first dimension of the matrix is the stakeholder:

- The *independent observer* who is not involved as a stakeholder.
- The *individual* who wants to be better off.
- The *group,* which wants to be better off.
- The *managers or owners* who want the organization to be better off.
- The *country,* which wants the society as a whole to be better off.

The second dimension is called as *system*, which is used to classify the type of system that is being evaluated:

- An *aspect* of IT use (e.g., a single algorithm or form of user interface)
- A *single* IT application (e.g., a spreadsheet, a PC, or a library cataloging system)
- A *type* of IT or IT application (e.g., TCP/IP, GDSS, a TPS, a data warehouse, etc.)
- *All* IT applications used by an organization or sub-organization
- An aspect of a system of a system development *methodology*
- The *IT functions* of an organization or sub-organization.

Classifying IS effectiveness measures by these two dimensions results in thirty possible classes of measures. The unit of analysis in each cell is the system evaluated from the

point of view of some stakeholder. This matrix was tested by classifying IS effectiveness measures from 186 empirical papers in three major IS journals for nine years (Seddon et al., 1999).

Seddon et al., argue that IS effectiveness matrix makes it clear that different measures are necessary for measuring IS effectiveness in different context. This argument conflicts with systematic combination of six different types of measure that is suggested by DeLone and McLean (1992). Unlike DeLone and McLean IS Success Model, Seddon et al., (1999) suggest that diversity of IS effectiveness measures must be encouraged.

2.1.3.4) A COMPREHENSIVE MODEL FOR ASSESSING THE QUALITY AND PRODUCTIVITY OF THE INFORMATION SYSTEMS FUNCTION: TOWARD A CONTINGENCY THEORY FOR INFORMATION SYSTEMS ASSESSMENT (KAPPELMAN, MYERS, AND PRYBUTOK, 1997)

Kappelman et al. (1997), provide an IS assessment framework which is related with organizational performance. Their literature review showed that high IS effectiveness is associated with high organizational performance (Carlson and McNurling, 1992a cited in Kappelman et al. 1997). Therefore, their paper gives a special attention to the organizational effectiveness issue.

Another issue that this article gives a special attention is the contingency theory. Kappelman et al. argue that managers confront the appropriate selection of measures and dimensions for assessing their organization. The selection process needs considering the internal and external environment of the organization. At this point contingency theory for IS assessment provides a strategy for the selection process. Kappelman et al. argue that it is unrealistic to generate a “one” solution if the varieties of the organizations are considered. Every organization is unique, so while assessing IS function each organization needs to take into account its peculiar context and appropriate measures.

DeLone and McLean (1992) support this view:

"The selection of measures should also consider the contingency variables, such as the independent variables being researched; the organizational strategy, structure, size, and environment of the organization being studied; the technology being employed; and the task and individual characteristics of the system under investigation." (pg.88)

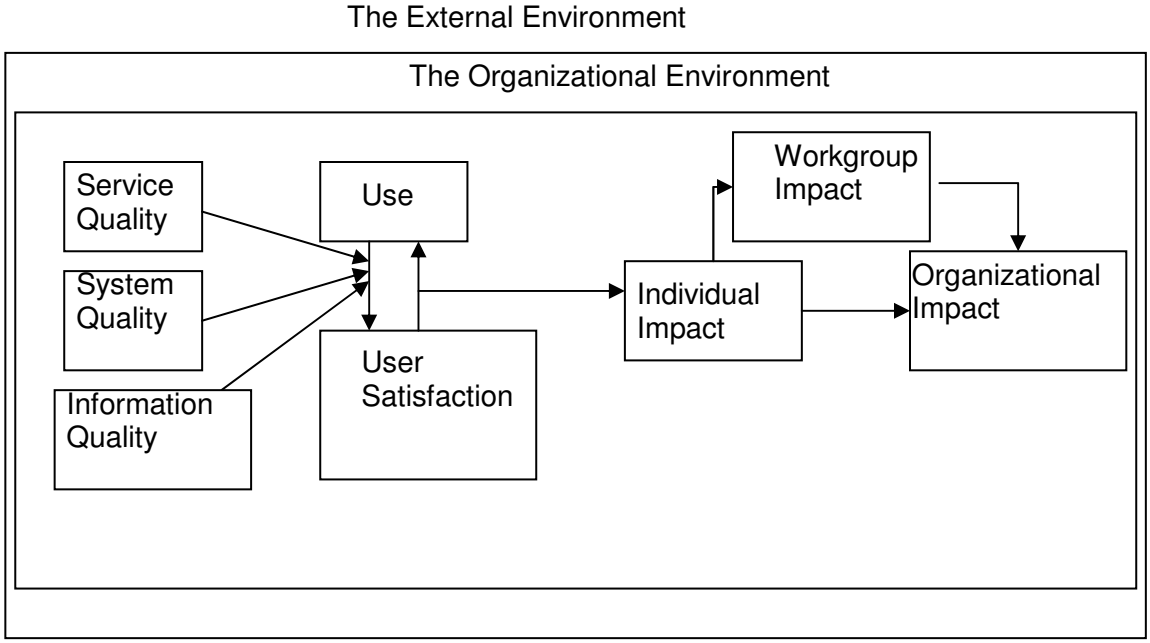

Figure 4 A comprehensive, IS Assessment Model and Contingency Theory (Kappelman et al., 1997)

Figure 4 introduces two new dimensions, which are "service quality" and "workgroup impact". Service quality dimension is used since the IS performs the needs of the information technology of the organization. Workgroup impact dimension is added since Kappelman et al., argue that workgroup is an important intermediate unit between the individual and organization. Therefore, workgroup impact is an important intermediate impact between individual and organizational impact. The other dimensions, system quality, information quality, use, user satisfaction, individual and organizational impacts, are dimensions of the DeLone and McLean IS Success Model.

2.1.3.5) MEASURING ORGANIZATIONAL IS EFFECTIVENESS: AN OVERVIEW AND UPDATE OF SENIOR MANAGEMENT PERSPECTIVES (SEDDON ET AL., 2002)

Seddon et al. (2002) write this article in order to illustrate the measurement practices of the organizations at the turn of the 21st century. The focus of the article is *organizational IS effectiveness measurement*. The model used for the research is the IS Efectiveness Matrix's (Seddon et al., 1999) 4th stakeholder which is "management or owner" versus "investments in IT generally" or "an IT project or a development methodology" or "a single application or type of application of IT" or "the IT function".

Learning about the practices of organizations' IS effectiveness measurements needs surveying managers. Seddon et al., surveyed senior IT managers in medium to large organizations in Europe and in the US. The survey questions are composed of three main parts. These are *evaluating an organization's overall IT investments*, *evaluating investments in a single IT application*, *evaluation of an organization's IT function (e.g. IS Department)*.

Findings of this research reflect the managers' opinions and practices of IS effectiveness measurement. One of the most important findings is that successful IS effectiveness measurement and successful IT performance suits each other. Although, it is not proved that one causes the other, it can be expected that good IT performance promotes enhanced IT evaluation applications. Moreover, in this research they found that managers expect success in issues written below:

- Cost efficiency
    - IT infrastructure
    - IT operations
    - IT R&D investments

- Service to the business
    - Customer satisfaction with IT products
    - Customer satisfaction with IT services

- Business improvements
    - IT support effectiveness

- Direct revenue/profit generation
    - IT profit generation
    - Competitive edge

In this thesis, the studied organizations' IS success measurement practices will be evaluated according to the reviewed literature of the information systems success measurement models in this section. All of the proposed models mentioned in this section explain different parts of the information systems success measurement problem. Therefore, all of the models mentioned in this section will be used in the analysis part of this research when necessary.

2.2) EXPECTATIONS FOR INFORMATION TECHNOLOGY INVESTMENT

2.2.1) DEFINITION

INFORMATION TECHNOLOGY

In the article of "Toward a More Precise Concept of Information Technology" defined Bakopoulos (1985) information technology as:

"Information technology is the set of non-human resources dedicated to the storage, processing and communication of information, and the way in which these resources are organized into a system capable of performing a set of tasks."(pg.20)

Based on this definition, it is possible to differentiate information systems from information technology. If we compare the definitions of information systems mentioned in Section 2.1.1 and definition of the information technology mentioned in this section, it is possible to see the difference about human factor. Unlike information systems, information technology is not associated with human resources. It is important to understand this difference between information systems and information technology because it will make much clearer to understand why information technology investment term is used for this study instead of information systems investment. If it is searched "information technology investment" or "IT investment" on the internet by the Google search engine, there are 32.300, 492.000 hits respectively. However, if "information systems investment" is searched, there are only 717 hits. If the term "information technology investment" is searched in the e-library of Association for Information Systems website, the number of hits is 80, whereas the number of hits for the term of "information systems investment" is 11. The same situation holds true, if the term, information technology investment, is searched in the e-journals provided by Academic Search Premier, Business Source Premier and Computer Source databases. The rate of the terms, information technology investment to information systems investment, cited in the articles in these databases is approximately 23 (690 articles/30 articles). Therefore, the term, information technology investment, is preferred to be used in this research.

In this research, "information systems (IS)" term is used for every system, which provides information flow in the organizations. However, in this study, the term, "information technology", is used as a subset of information systems in the organization. IT is accepted as a subset of IS because information technology is part of an information system that constitutes computers, tools, software, hardware, databases, servers, etc., functions as infrastructure for the organization's information systems. Therefore, in this study, it is accepted that investments are done in the form of information technology.

The IT investment, after the implementation of information technology becomes the part of the organization's information systems.

EXPECTATION

In Merriam-Webster online dictionary "expectation" is defined as *act of expecting* and "expect" is defined as to *look forward; mean to await some occurrence or outcome* (www.m-w.com).

Expectation is accepted as a term, which relies upon due to the perception of implicit or explicit promises made by the parties (Burkman, 2000). Bhattacherjee (2001) mentions that expectation is defined as pre-consumption beliefs about the overall performance of products or services or is defined as beliefs about the level of product or service attributes and operationalize expectation as either individual beliefs or the cumulative of these beliefs.

Expectation differs from psychological contract (Hartzel and Flor, 1995; Rousseau and Tijorwala, 1998). Rousseau and Tijorwala (1998) argue that although all psychological contracts entail expectations that a person or firm will act in a particular way, not all expectations are contractual. Sabherwal (1999) argues that unlike written contract, psychological contract consists of unwritten and largely unspoken sets of corresponding expectations held by the transacting parties about each other's rights and obligations. Based on this argument, it can be inferred that expectation is both different than psychological contract and written contract. Based on the different meaning from psychological contract or written contract, it can be said that expectation consists of a largely unwritten but communicated beliefs held by the transacting parties. According to Rousseau and Tijorwala (1998), expectation is a far broader concept, which involves not only beliefs based upon promises but also other expectations occurring from causal reasoning or detailed beliefs.

Moreover, expectation differs from requirement. In Merriam-Webster e-dictionary "requirement" is defined as *something required; something wanted or needed; necessity; something essential to the existence or occurrence of something else; condition* (www.m-w.com). Therefore, it is also important to differentiate expectation for IT investment from system requirements. As mentioned in the expectation definition, expectations prior to implementation of information technology (Ginzberg, 1981) are related with the beliefs of the party about anticipated performance of (Bhattacherjee, 2001) of the implemented system. However, system requirements are related with the characteristics of the system that must be realized at the end of the implementation of the system. Hence, expectations for IT investment and system requirements are related with each other. Expectations for the IT investment are converted to the system requirements, in order to provide the realization of expectations. Therefore, it is possible to say that "expectations" is much broader term than "requirements" term.

Expectation concept has been widely used by information systems researchers in order to explain the outcome of information systems development efforts (Hartzel and Flor, 1995; Ginzberg, 1981). Moreover, according to Bhattacherjee (2001), expectation provides the baseline level when assessing the users' satisfaction and the user's perceived usefulness of the information system. As explained before, after the information technology invested and implemented, it becomes part of the information system in the organization. Therefore, it can be said that information systems development efforts include IT investment as well as expectations for IT investment. When the customer sees the investment, performance of the investment is compared to the expectations formed before the investment (Hartzel and Flor, 1995). Ginzberg (1981) argues that user's pre-implementation expectations about a system are the indicators of the likely success of the system. He also argues that a priori expectations could be used to assess the realism of users' expectations (Ginzberg, 1981).

2.2.2) IT INVESTMENT AND EXPECTATION

IT investment is an important issue in IS effectiveness topic. Today, many firms' information systems are based on the information technology. According to Weill and Olson (1989), there are four types of IT investment:

- Threshold IT investment: Firm invests in order to enter, compete or remain in the market.
- Transactional IT investment: Firm invests in order to reduce the cost of doing business.
- Informational IT investment: Firm invests in order to improve management decision making made for medium term goals.
- Strategic IT investment: Firm invests in order to obtain competitive advantage made for long term goals.

Weill and Olson (1989) argue that appropriate measures can be matched according to the type of IT investment. Also, measures should be selected according to the industry and to the organization needs. Therefore, measuring IS effectiveness requires recognizing many aspects of IT investment. One of which is IT investment expectation; this issue will be discussed later in this section.

A firm's investment in IT creates business value. Kohli and Sherer (2002) provide guidelines for IT benefit initiation. The focus of the guidelines is the measuring payoff of the information technology investment. In the article, former IT investment payoff research is studied and categorized. Kohli and Sherer argue that IT payoff metrics of the former studies are grouped in three:

1) Profitability
2) Productivity
3) Consumer Value

Kohli and Sherer propose that former studies used "variance" and "process-oriented" measurement approaches. The first one takes the variance of dependent variables such as return on assets, profitability, or customer satisfaction. The latter measurement approach probes the process of how IT investment creates organizational impacts. The process starts with IT investment; the investment is converted to IT assets. IT assets are converted to IT impacts and IT impacts create organizational impacts. Based on these former studies, Kohli and Sherer produce the guidelines.

One of the guidelines specifies the importance of understanding the objective of IT. According to this guideline, a firm must understand the motives and expectations for IT investment. The defined reasons and expectations make the firm's management aware of the role of IT. Moreover, defining IT expectations is necessary to determine the measures of IT investment.

Broadbent and Weill (1997) did a research with twenty-seven firms. They collected the data of the last five years of the firms' IT investments. From the research, they proposed a framework, which helps managers to determine the IT infrastructure capabilities in order to succeed in business goals. In the article, "Building IT Infrastructure for Strategic Agility", Broadbent, Weill, and Subramani, (2002) defined IT infrastructure as:

"IT infrastructure is, of course, not simply a compact disc in a yellow box marked Norton Antivirus or even a comprehensive SAP billing program, but a collection of reliable, centrally coordinated services budgeted by senior managers and comprising both technical and human capability."(pg.59)

In the framework, there is a cycle that relates strategic context of the firm to the "business maxims" and business maxims to the "IT maxims" of the firm. Identification of the IT maxims results in clarification of the firm's view of IT infrastructure.

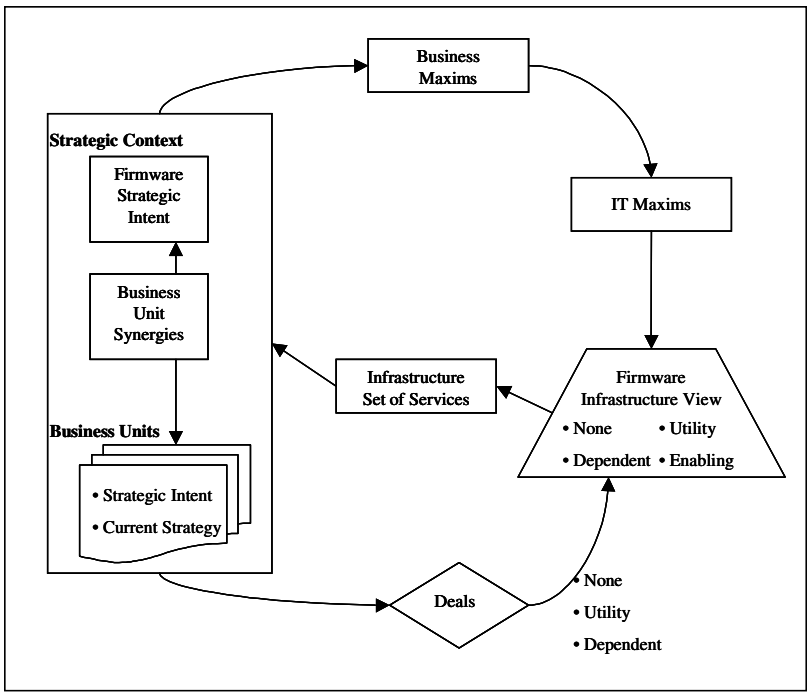

Figure 5 Linking Strategy and IT infrastructure Framework (Weill and Broadbent, 1997)

In Figure 5, the Weill and Broadbent's framework (1997) shows an IT maxim representing how the firm utilizes IT in the firm. IT maxims are composed of five categories. These are:

- Expectations for IT investments in the firm
- Data access and use
- Hardware and software resources
- Communications capabilities and services
- Architecture and standards approach

Expectations for IT investments are an important category when realizing firm's strategy aligned information systems. In this research, Broadbent and Weill (1997) reached some examples of expectations for IT investments from the studied firms:

- We use IT to reduce costs through eliminating duplicated efforts.
- Our spending must meet defined business needs and show clear cost savings.

- IT expenditure must improve customer service levels.
- IT is viewed as a service provider focused on satisfying end-user requirements.
- IT is used to meet local needs in business units.
- IT has a strategic role in achieving our firm objectives, rather than just a vehicle for cost displacement.
- We develop innovative business and marketing applications of leading-edge (but stable) technologies
- Our business is about creating new products/services using IT.

Like Broadbent and Weill (1997), Clemons and Weber (1990) present a similar argument for making strategic IT investments. Their guidelines for decision making of IT investment include defining clear desired strategic objectives such as:

- Increased market share
- Lower costs
- New geographic reach
- Business growth
- Enhanced quality
- Better customer service
- Being competitive

These strategic objectives can be seen as both expectations and justification items for IT investments.

How defining IT investment expectations can contribute to the IS success evaluation is explained in the Process Model of Expectation Management (Lycett and Giaglis, 2000).

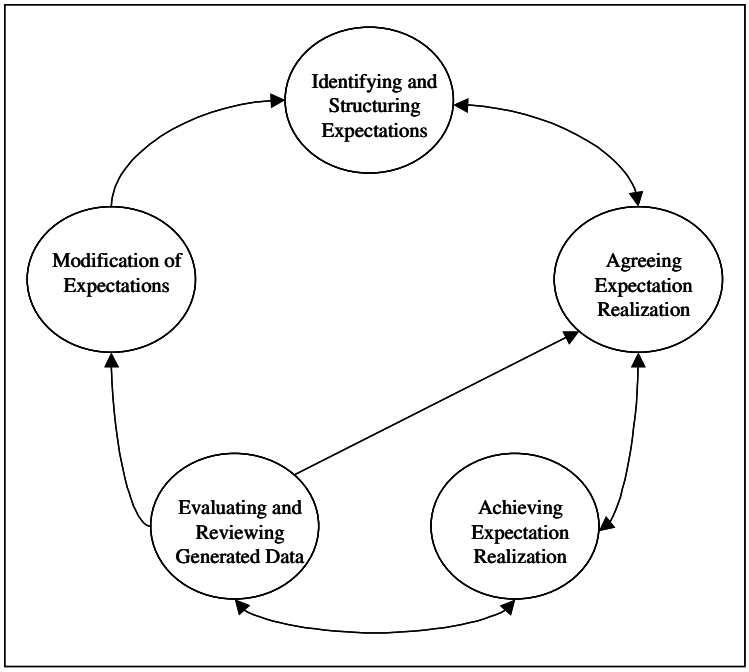

Figure 6 Process Model of Expectation Management

In Figure 6, the model shows that evaluation of IS/IT benefits is enlarged with a concept, expectations. Lycett and Giaglis (2000) think that evaluation tells the difference between the desired and the existing situations and, identifying expectations contribute as a basis for evaluation and organizational goals change. As mentioned in chapter 1.1, Seddon (1997) argues that IS success measures are used after the system implemented and used for some time. However, there exists a behavioral part in the Respecified Model of IS Success that represents the expectations before the system implemented. Unlike DeLone and McLean, Seddon argues that "IS Use" is not a success measure dimension but a dependent variable in the behavioral model. Although Seddon claims that behavioral is not part of the IS Success model, still he claims that higher expectations cause higher "IS Use". The expectation management model is composed of five ongoing steps.

First step requires identifying the expectations and, as a result of identified expectations, appropriate measures decided. The first step implementation can be seen as implementing the contingent usage of IS success models. Kappelman et al. (1997), propose that contingency theory supports the IS success measurement selection strategy.

In other words, each IT investment situation requires measurement of different variables and as a result, different variables require different measures. For example, DeLone and McLean (2002) suggest that their IS success model's dimensions and measures selection should be based on the contingent objectives and context. From the expectation management model's point of view, each entity (end user, management, organization) has different expectations from each different IT investment and each identified expectation requires different appropriate measures.

The second step is the agreement part of the expectations. At this step, all parties have to agree on the type of investment and its expected benefits. This step can be seen as a contract between all parties. For example, if a firm wants to outsource one of its operations, the firm should provide very carefully scrutinized expectations, which are converted to the requirements document.

The third step is the realization of expectations and the fourth step is the evaluation of the results of the implemented system. The third step can be seen as IT Investment stage. For the fourth step, in order to understand whether the expectations are realized, a measurement effort is needed. Based on the IS success literature, the step can be implemented by one of the IS success models such as DeLone and McLean (1992) or Kappelman et al.'s (1997) IS success models. An appropriate IS success model usage will reveal if the expectations realized or not. For example, the firm decides to use DeLone and McLean's IS Success Model. According to the agreed expectations, firm selects the success dimensions to be measured. When success dimensions are determined, corresponding measures will be chosen. Then, the measurement process takes place. The findings will show if the investment is successful and, as a result whether the expectations are realized.

In the model, there is a feedback mechanism between the fourth and second steps, which results in modification of expectations. A similar feedback mechanism exists in the re-specified IS success model of Seddon (1997). In some cases modification of

expectations may not be needed, however, most of the time expectations before the IT implementation and benefits after the IT implementation do not completely overlap. Why modification of expectations is needed is that modification of expectations will contribute to organizational learning. Moreover, in the article of "A re-specification of the DeLone and McLean model of IS success", Seddon (1997) proposes that if expectations are revised continuously, it will lead to updated levels of IS use. Future IT investments can make use of the former evaluated investments as a benchmark and learn from its wrongs and rights. In this study, the studied organizations' expectations for IT investments will be evaluated according to the reviewed literature of the expectations for IT investment in this section.

Based on the literature on IS success and IT evaluation, Table 1 is formed. The Table 1 classifies major research directions and proposed measures. It mentions six major studies about measuring value of the information system. It gives the details of the research such as research method, research medium, their success dimensions and success measures. Table 1 shows which aspects of the information system are taken into account in order to evaluate its success. Moreover, this table shows which factors are used for measuring the success of the corresponding aspects of information system. Since the space of column is not enough for measures of the success dimensions, corresponding tables, Table 2, Table 3, Table 4, Table 5, Table 6, Table 7 related to the studies are shown respectively.

Table 1 Major Research in Information Systems Success Measurement and IT Evaluation Literature

Name of the Researcher	**Name of the Model/Study**	**Research Method**	**Research Medium**	**Success Dimensions**	**Success Measures**
DeLone and McLean, 1992	IS Success Model	Review of Former IS Studies	Journal Review	1) System quality 2) Information quality 3) Information use 4) User satisfaction 5) Individual impact 6) Organizational impact	See Table 2 DeLone and McLean IS Success dimensions and measures
Saunders and Jones, 1992	IS Function Performance Evaluation	Delphi Study	Interview with Senior Manager	1) IS Impact on strategic direction 2) Integration of IS planning with corporate planning 3) Quality of information outputs 4) IS contribution to organizational financial performance 5) IS function operational efficiency 6) User/management attitudes about IS function 7) IS staff competence 8) Integration with related technologies across other organizational units 9) Adequacy of system development practices 10) Ability of IS function to identify and assimilate new technology	See Table 3 Saunders and Jones Performance Dimensions and Associated Measures
Myers; Prybutok and Kappelman, 1997	IS Assessment Framework	Review of Former IS Studies	IS Literature	1) System quality 2) Information quality 3) Information use 4) User satisfaction 5) Individual impact 6) Organizational impact 7) Service Quality 8)Workgroup Impact	See Table 4 Myers; Prybutok and Kappelman IS Assessment Framework

Table 1 Major Research in Information Systems Success Measurement and IT Evaluation Literature (continued).

Lester and Willcocks, 1997	IT Evaluation Practice	Survey	Survey of 150 Senior IT managers	1) Technical efficiency or project evaluation 2) Business-related performance measures	See Table 5 Lester and Willcocks IT Evaluation Practice
Staples; Patnayakuni; Bowtell and Seddon, 1999	IS Effectiveness Matrix	Review of Former IS Studies	IS Literature	1) Dimension: Type of the system • An aspect of IT use • A single IT application • A type of IT or IT application • All IT applications • An aspect of a system development methodology • The IT function of an organization or sub-organization 2) Dimension: stakeholder • The independent observer • The individual • The group • The managers or owners • The country	See Table 6 Staples; Patnayakuni; Bowtell and Seddon IS Effectiveness Matrix
Kohli and Sherer, 2002	Measuring Payoff of Information Technology Investments	Review of Former IS Studies	IS Literature	1.Dimension: • Operational IT • Managerial IT • Strategic IT 2.Dimension: • Investment • IT Assets • IT Impacts • Organizational Impacts	See Table 7 Kohli and Sherer Measuring Payoff of Information Technology Investments

Table 2 IS Success Dimensions and Measures by DeLone and McLean

Dimensions	**Measures**
1) System quality	Data accuracy, Data currency, Database contents, Ease of use, Ease of learning, Convenience of access, Human factors, Realization of user requirements, Usefulness of system features and functions, System accuracy, System flexibility, System reliability, System sophistication, Integration of systems, System efficiency, Resource utilization, Response time, Turnaround time
2) Information quality	Importance, Relevance, Usefulness, Informativeness, Usableness, Understandability, Readability, Clarity, Format, Appearance, Content, Accuracy, Precision, Conciseness, Sufficiency, Completeness, Reliability, Currency, Timeliness, Uniqueness, Comparability, Quantitativeness, Freedom from bias
3) Information use	Amount of use/ duration of use: Number of inquiries, Amount of connect time, Number of functions used, Number of records accessed, Frequency of access, Frequency of report requests, Number of reports generated, Charges for system use, Regularity of use Use by whom? Direct vs. chauffeured use Binary use: Use vs. nonuse Actual vs. reported use Nature of use: Use for intended purpose, Appropriate use, Type of information used, Purpose of use Levels of use: General vs. specific Recurring use, Institutionalization/ routinization of IS use, Report acceptance Percentage used vs. opportunity for use, Voluntariness of use, Motivation to use
4) User Satisfaction	Satisfaction with specifics, Enjoyment, Overall satisfaction, Single-item measure, Multi-item measure, Software satisfaction, Decision-making satisfaction, Information satisfaction: Difference between information needed and received
5) Individual impact	Information understanding, Learning, Accurate interpretation, Information awareness, Information recall, Problem identification, Decision effectiveness: Decision quality, Improved decision analysis, Correctness of decision, Time to make decision, Confidence in decision, Decision-making participation, Improved individual productivity, Change in decision, Causes management action, Task performance, Quality of plans, Individual power or influence, Personal valuation of IS, Willingness to pay for information

Table 2 IS Success Dimensions and Measures by DeLone and McLean (cont.)

6) Organizational impact	Application portfolio: Range and scope of application Number of critical applications Operating costs reductions, Staff reduction, Overall productivity gains, Increased revenues, Increased sales, Increased sales, Increased market share, Increased profits, Return on investment, Return on assets, Ratio of net income to operating expenses, Cost/benefit ratio, Stock price, Increased work volume, Product quality, Contribution to achieving goals, Increased work volume, Service effectiveness

Table 3 Performance Dimensions and Associated Measures by Saunders and Jones

1) IS Impact on strategic direction	• Market share increases attributable to IS function • Profit increases attributable to IS function • Organization would be out of business without IS
2) Integration of IS planning with corporate planning	• IS documented plan is designed to support the corporate strategic plan • Forecasts of IS capabilities exist • Corporate and IS plans jointly developed
3) Quality of information outputs	• End-user surveys (in-house) • Customer/client surveys(individuals not in organization) • Log of errors encountered by users maintained
4) IS contribution to organizational financial performance	• Return in Investment • Return on Assets • Cost Allocation (Method of accounting for systems operations and development) • Value added by information technology (return on management) • Industry average comparison of IS budgets as a percentage of revenue • Budget performance (ability to meet IS budgets) • Cost of maintaining systems
5) IS function operational efficiency	• Log of system availability • Users' perceptions surveys • User turnaround time (batch) • Log of computer and communication up/downtime • System response time (on line)

Table 3 Performance Dimensions and Associated Measures by Saunders and Jones (cont.)

6) User/management attitudes about IS function	• Management and user perceptions of IS performance • User surveys of user participation in systems development • User surveys of IS responsiveness to user needs • Time for IS function to respond to user complaints • Complaint logs
7) IS staff competence	• Number of managerial and technical education programs for IS staff • Career ladder(s) for IS staff exist • Formal performance appraisal system used • Level of education of IS staff: degrees and professional certification
8) Integration with related technologies across other organizational units	• User/IS development of user/IS budget
9) Adequacy of system development practices	• Percentage of projects completed on time and/or within budget • Standard methodology for system analysis and design exists • Evaluation of user and IS function documentation is performed • Estimates of number of man-years in backlog of system development requests
10) Ability of IS function to identify and assimilate new technology	• Formal reward system for innovative thinking and suggestions using information technology • Number of technical breakthroughs

Table 4 IS Assessment Framework by Myers, Prybutok and Kappelman (The framework measures include DeLone and McLean's IS Success Model measures and the measures below.)

7) Service Quality	8) Workgroup Impact
• Return on quality • SERVQUAL • Reliability • Responsiveness • Competence • Access • Courtesy • Communication • Credibility • Security • Understanding/knowing the customer • Tangibles (personnel appearance, tools, equipment)	• Better decision quality • Increased participation • Fewer meetings over less time are required to solve problems • Participants stay focused on task • Efficiency of the negotiation process during union bargaining • Effectiveness of the original solutions • Solution quality • Efficiency in terms of total comments and file size • Satisfaction with the group process

Table 5 IT Evaluation Practice by Lester and Willcocks

Technical Efficiency or Project Evaluation	Business-related Performance
• System reliability • Network reliability • Project Completion to time • Project Completion to budget • User satisfaction • Return on investment • Financial cost analysis	• Customer/user satisfaction • Improvements in business process operations • Effectiveness in meeting specific business goals • Broad-based quality rating of IT services

Table 6 IS Effectiveness Matrix by Seddon, Staples, Patnayakuni, and Bowtell (IS Effectiveness Measures Used For Different Combinations of Stakeholder and System: Some Examples)

		1	2	3	4	5	6
	Stakeholder or interest group	An aspect of IT design or use (e.g., algorithm, query language, or user interface)	a single IT application in an organization (e.g., this GDSS)	a type of IT or IT application (e.g., any GDSS, data warehouse, etc.)	all IT applications used by an organization or sub-organization	an aspect of a system development methodology (including reengineering)	an IT function in an organization
1	Independent observer (stakeholder independent)	Accuracy or speed of algorithm [Mookerjee, Mannino and Gilson 1995]	Performance outcome expectations after learning to use spreadsheet or word processing package [Compeau and Higgins 1995]	Communication effectiveness choice between e-mail and face to face [Zack 1993]	Cumulative abnormal returns of firms following IT investment announcements by 97 firms, 1981-1988 [Dos Santos, Peffers, and Mauer 1993]	Accuracy and consistency of software estimates [Mukhopadhyay, Vicinanza, and Prietula 1992]	Important skills for EIS developers from survey of current practices [Watson, Ranier, and Koh 1991]
2	Individual Primary focus: Individual better-offness	User acceptance of Expert System advice for expert systems with explanation facilities [Ye and Johnson 1995]	Creative Performance (fluency, novelty, value), satisfaction of students using creativity enhancement software [Massetti 1996]	Work-Family conflict due to after-hours work-related home computer use [Duxbury, Higgins and Mills 1992]	Self-rated job performance of users of up to five systems in 25 departments [Goodhue and Thompson 1995]	User Satisfaction as consequence of User participation and four moderator variables. [McKeen, Guimaraes, and Wetherbe 1994]	Service Quality [Pitt, Watson, and Kavan 1995] (3 firms)

Table 6 IS Effectiveness Matrix by Seddon, Staples, Patnayakuni, and Bowtell (cont.)

3	Group Primary focus: Group better-offness	Post- meeting consensus, degree of confrontiveness, quality of recommendations in variations in GDSS design [Sambamurthy and Poole 1992]		Equality of participation, Perceived group performance in GDSS [McLeod and Liker 1992]			
4	Management or Owners (of a firm) Primary focus: Organizational better-offness	Perceived usefulness of computer-based information for financial and operations management [Kraemer, Danzinger, Dunkle, and King 1993]	Price premium per gallon for fuel sold via the Cardlock system [Nault and Dexter 1995]	Reduced inventory holding costs, Reduced premium freight costs at Chrysler, following introduction of EDI [Mukhopadhyay, Kekre and Kalathur 1995]	Sales growth, ROA, labor productivity [Weill 1992] (33 firms)	Cost savings, quality improvement, customer satisfaction from Business Process Reengineering [Caron, Javenpaa and Stoddard 1994]	Benefits to the firm flowing from IT outsourcing: [Lacity and Hirscheim 1993]* * not from the three IS journals analyz*ed.*
5	A Country Primary focus: Society's better-offness			Evolution of electronic market for computerized loan origination. [Hess and Kemerer 1994]	Productivity, and Consumer Surplus [Hitt and Brynjolfsson 1996] (370 firms, one country)		Not applicable

Table 7 Measuring Payoffs of Information Technology Investments by Kohli and Sherer

	Operational IT	Managerial IT	Strategic IT
Investments	Financial Investment in • FTE's (employees) • Equipment • Consulting	Financial Investment and budgeting for • Applications • Training • Education	Financial Investment and budgeting for • Collaborative technologies • Electronic Data Interchange • ERP

Table 7 Measuring Payoffs of Information Technology Investments by Kohli and Sherer (cont.)

IT Assets	Number of: • Workstations • Automated check-in counters • Assembly machines • Toll processing stations • Modems • Information Kiosks • Trainers	Number of: • Process Redesign projects • Extent of Process redesign measured by number of • Person hours invested • Departments involved • Change management Initiatives • Managerial Reporting infrastructure such as cost accounting applications	Number of: • Hubs and Routers • Imaging technology • Knowledge based applications • Teams working on strategic systems • Industry and vendor partnerships • IT Payoff measurement process
IT Impacts	Number of: • Customers serviced • Hits on the website • High quality pieces produced • Problems resolved • Returning customers • Customers referred by other customers • Orders processed /day • Sales/employee • Loan approval days • Rain check issue • Special orders placed	Number of: • Escalations • Missed deadlines • Extension of Project end dates • Reporting errors • Technology substitution • Mid-project process redesigns • Adverse event Episode detection • Product Recalls • Average Length of Stay	• Actual usage by period by user • Extent of integration of It into corporate decision making such as the number of • Reports requested • Scenarios analyzed
Organizational Impacts	• Profitability • ROI • ROA	• Employee Turnover • Maintenance Expense • Downtime • Mortality Rate (health care)	• Market Share • Ranking • Industry Awards • Customer Service Rating • Stock price • Financial Rating

2.3) QUALITATIVE RESEARCH

Before getting into details of qualitative research method, epistemology that supports the all kinds of research should be mentioned. Myers (1997) defines "epistemology" as assumptions about the knowledge and how it can be obtained.

Based on the epistemology definition, Myers (1997) proposes three underlying philosophical assumptions:

- Positivist Research: This research type tries to test the theory and understand the phenomena. It assumes that the fact is objectively given and can be explained by measurable instruments independent from the researcher.
- Interpretive Research: In the case of IS research, this research type tries to understand the context of the information systems and how this context affects the information systems process and how this information systems affects its context.
- Critical Research: This type of research aims to understand the conflicts and oppositions in the area it is being searched and tries to solve causes of these conflicts.

Keeping the underlying philosophical assumptions in mind, Maxwell (1996) defines qualitative research as focusing on specific situations or people and stressing words rather than numbers. Myers (1997) does a similar qualitative research definition to Maxwell's definition; he defines qualitative research as studying people and their social and cultural context in which they live. However, against confusing underlying philosophical assumptions and qualitative research methods, Myers (1997) adds that:

"… 'Qualitative' is not a synonym for 'interpretive' - qualitative research may or may not be interpretive, depending upon the underlying philosophical assumptions of the researcher. Qualitative research can be positivist, interpretive, or critical. It follows

from this that the choice of a specific qualitative research method (such as the case study method) is independent of the underlying philosophical position adopted."(pg.1)

Benbasat (1984) contributes to Myers' addition that research method selection should be based on the goals of the researcher and the nature of the research topic.

Quantitative research has always been a major research method in Information Systems Research. Vast amount of IS research has been done by quantitative research techniques. However, there has been a tendency to make use of qualitative research when dealing IS issues. It is known that IS is an interdisciplinary area and a social system that requires context dependent research (Kaplan and Duchon, 1988). Benbasat, Goldstein, and Mead (1987) explain that:

"The information systems area is characterized by constant technological change and innovation. IS researchers, therefore, often find themselves trailing behind practitioners in proposing changes or in evaluating methods for developing new systems. Researchers usually learn by studying the innovations put in place by practitioners, rather than by providing the initial wisdom for these novel ideas."(pg.370)

Because IS has unique features, like fast development of the area, explained above, it is argued that exclusive reliance on statistical or experimental testing of hypothesis has some disadvantages (Kaplan and Duchon, 1988). The first one is explained that science can not evolve from the incremental results gathered through statistical significance testing of hypothesis. The second disadvantage is the researcher's bias that he/she can control the environment of social systems. Since social systems like IS, include so many uncontrolled variables and applying statistical or experimenting methods that statistical and experimental testing can remove the context and understanding of what actually is happening (Kaplan and Duchon, 1988).

There are some reasons of changing the focuses of IS researchers from technical issues towards organizational issues and why researchers are dissatisfied with the information provided by quantitative methods (Benbasat et al., 1987). According to Benbasat et al. (1987), there are four reasons that cause dissatisfaction:

1. Complexity of multivariate research methods,
2. The distribution restrictions in the quantitative research methods,
3. The large sample size dictation of the quantitative research methods,
4. The difficulty of understanding and interpreting the results.

The above listed dissatisfaction reasons can be resolved by qualitative research methods. Since the IS studies require more organizational related issues to be searched, qualitative research can provide context and human based research more than a quantitative research can provide. What makes qualitative research stronger is that its inductive approach and its focus on specific situations or people and its stress on words rather than numbers (Maxwell, 1996). Maxwell (1996) lists five research reasons, which suit especially qualitative works:

1. Understand the meaning of the events, situations, and actions from the viewpoint of the participants.
2. Understand the context, which the participants affect.
3. Understand the unexpected phenomena and its effects, and evolve theories from the effects.
4. Understand the process in which the participants' actions take place.
5. As long as dealt with validity threats, develop causal explanations.

From the listed reasons suit qualitative work, it can be said that qualitative research complements the requirements of IS research and terminate the reasons of dissatisfaction caused by quantitative research.

2.3.1 CASE STUDY

According to the paper of Myers (1997), there are four types of Qualitative Research Methods:

- Action Research: As Myers (1997) mentions that the most widely cited definition of action research belongs to Rapoport (1970 cited in Myers, 1997):

  "Action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework."(pg.499)

- Case Study Research: Yin (1994) defines the case study as:

  "A Case Study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident."(pg.13)

  As far as IS research is concerned, Benbasat et al. (1987) add that case study research method suits well to IS research. Since, the focus of study of information systems moved from technical issues to the organizational issues.
- Ethnography: This method is performed by spending enough time in the field in order to place the phenomena studied in their social and cultural context (Myers, 1997).
- Grounded Theory: Also thought as mode of analysis, grounded theory tries to reveal out the data that is systematically gathered and analyzed and makes theory out of that data (Myers, 1997).

Benbasat et al. (1987) claim that the case study is an appropriate method to gather the knowledge of practitioners and evolve theories from it. They argue that since, case study

depends less on priori knowledge of variables and how to measure these variables, case study differs from other methods used in IS research. These other methods are field experiments, laboratory experiments. Moreover, Benbasat et al. argue that case study is mostly used for exploring and hypothesis producing and is applicable for IS research. Benbasat et al. (1987) propose three reasons for applicability of case study:

1. The IS researcher can study the information systems in its natural environment.
2. Case study allows researcher to ask "how" and "why" questions, which enables the researcher to grasp the all aspects of the information systems processes.
3. Since IS field topics change rapidly, there are few studies for many of these topics. And, case study is a favorable method if there are few studies done in the research field.

Moreover, Benbasat et al. (1987), list kinds of situations that using case study approach gives the best result. The first one is when the research and theory are at their early and establishment stages. The second situation is when the actors and the context are important and researcher want to understand the practice based problems. According to Yin (1994), the best environment to use case study approach among other approaches, like experiment, survey, archival, history, is when a "how" or "why" question being asked about a current set of events over which the researcher has little or no control.

After deciding the type of research method, the researcher needs to collect data. In qualitative research, observations, interviews, questionnaires, documents and texts, researcher's opinion can be sources of the data collection. If the researcher gathers his /her own data which is unpublished, it is called the primary source. If the data is the published one, it is called secondary source.

In this study, interviews and semi-structured questionnaire will be the basis of the data collection. What is expected from this study is to understand the expectations of the respondents about the information technology investments and to find out the role of the

expectations in the information systems success. It is hoped to find out new issues in the areas of IS success and expectations for IT investment. It is difficult to come up with new variables with scale-based questionnaires. Most of the time, scale based questionnaires are useful while testing the appropriateness of the variables or models. However, the study aims to contribute information systems success literature with new findings rather than testing the existent findings. Therefore, qualitative research will serve better to the needs of the study.

Moreover, in order to do this study, a flexible research method is beneficial. The flexibility gives the advantage of interviewing the respondents in depth and understanding the context and the development of the process in a wider respect. As a general research type, qualitative research and as a specific research type, case study will enable to query the respondents freely and understand the process, organization, respondent and their interaction in depth.

CHAPTER 3

RESEARCH DESIGN

The details of the research will be discussed in this chapter. In the thesis, Company A, Company B, Company C and Company D are selected for this case study. Reasons for selection of the firms, data collection methods, and research questions will be discussed in the following sections.

3.1) REASONS FOR THE CASE SELECTION

In the thesis, before data collection, some research design issues had to be decided for the case selection. These research design issues were deciding the research sampling type, the number of cases to be studied and the type of data to be collected.

Probability sampling and convenience sampling are the two major sampling types in quantitative research. However, selecting times, settings, and individuals that can provide information about the research questions that you want to answer is the most important consideration in qualitative sampling decisions (Maxwell, 1996). This type of sampling is called *purposeful sampling*. In this type of sampling, the case selection is done deliberately because the researcher believes that the research questions can be answered by that specific case or cases but not by the others (Maxwell, 1996).

Deciding single-case versus multiple-case is another research design issue. According to Benbasat et al. (1987), most research efforts require multiple-case design. Yet, single-case studies are suitable when the case is a revelatory case or a critical case for testing a well-formulated theory or an extreme or unique case. On the other hand, multiple-case studies are suitable when the aim of the research is description, or theory building, or theory testing. Moreover, multiple-case designs allow cross-case analysis and the extension of theory, as well as, multiple-case designs provide more general research results (Benbasat et al., 1987).

Since, the aim of the research is the description of the companies' IS success measurement practices and their expectations for IT investment, purposeful sampling and multiple-case design are employed for the research. The studied four companies are in the same industry, software industry. However, since four companies do defense related projects, it is possible to say that they also operate in defense industry. All four companies develop software, information systems and information technology for their customers from various industries, but mostly, they do projects for National Defense Ministry. One of the reasons to select these companies is the acquaintances who made interviews possible. In other words, the interviews are arranged by the help of the acquaintances. Another reason for selecting these companies is the proximity, and except Company D, the interviews are done in Ankara. It is important to mention that the aim of this work is not to establish generalized conclusions about IS investment decisions of IS developing firms, rather, simply to observe the behavior of the selected organizations and possibly propose hypotheses about the existence or nonexistence of certain practices.

Respecting the privacies of the participant organizations and interviewees, the organizations are coded as A, B, C, and D. The organizations will be represented with these letters in the following chapters.

Company A is a system integration and software development company having a business presence and interest both in defense and non-defense industry. It was

established in 1998 and it has 90 employees. It has business activities in military command control systems, information technologies and systems, management information systems, decision support systems, simulation and training systems, and hardware production with sub-contract management. It has qualifications such as: NATO AQAP-150, TS-EN-ISO 9001:2000 and SEI CMMI Level 5 (Note: At the time this research was conducted, this firm had SEI SW-CMM Level 3.); IEEE/EIA 12207 and MIL-STD 498 standards for software engineering; EIA/IS-632 and IEEE 1220 standards for system engineering; ANSI/IEEE 1042, IEC/ISO 15846 and MIL-STD 973 standards for configuration management. Price and cost analysis system, commodity exchange information system, vehicle/ship tracking system, optimum logistic system, software development process and control system and supply and maintenance information system are the information systems applications of Company A.

Company B was founded in 1991. It has got 164 employees. Company B has business activities in design, development and integration of general and/or special purpose software applications; systems engineering, design, integration and application; information infrastructure consultancy; technical support and consulting; integrated logistics support. Company B has qualifications such as: NATO Quality Assurance Requirement - AQAP 150, TSE-ISO-9000-2000; ISO-9000, IEEE 12207, AQAP-150, and MIL-STD-498 standards for software quality engineering. Configuration management system, human resource management system, and accounting management system are the information systems applications of Company B.

Company C is a leading high-tech company in Turkish defense industry specialized in defense electronics and electronic warfare systems. It was established in 1987 in Ankara, has the expertise in the fields of integrated self-protection electronic warfare systems, electronic intelligence and electronic support measures systems in terms of system and software design and development, system and software integration, system level test and evaluation, and integrated logistics support. Company C has the following qualifications: MIL-STD 498 and AQAP-150 standards for software development; MIL-Q-9858A, AQAP-110, and ISO-9001:2000 standards for design and manufacturing;

MIL-STD-45662 and AQAP-6/10012-1standards for calibration; MIL-STD 973 standard for configuration management. Workflow for the real-time enterprise, software configuration management, document and software change management, document management and distribution are the information systems applications of Company C.

Company D was founded in 1997. It has got 960 employees. It has business activities in outsourcing, e-learning, e-government, e-business consulting services, IT services, application and development services, electronic and mobile business solutions. It has qualifications such as: ISO-9000-2000; AQAP-150 standard for software quality. Performance management system, e-workflow system, and human resource management system are the information systems applications of Company D.

3.2) DATA COLLECTION METHOD

Qualitative research and case study method have been examined in the literature review (section 2.3). Multiple data collection methods are used in the research. Collecting information from a diverse range of individuals and settings using a variety of methods is called triangulation (Maxwell, 1996). Triangulation provides obtaining rich set of data and capturing the contextual complexity (Benbasat et al., 1987). Moreover, triangulation provides greater support for researcher's conclusions (Benbasat et al, 1987). Therefore, the following data sources were used in this study:

- Documentation: Websites of the companies which give details about their work activities, completed projects, on going projects, the products developed, systems used, and technical documents given by some of the companies were used to evaluate current situation of the studied companies.

- Interviews: Based on the case study method, a semi-structured questionnaire (see Section 4.2) was designed for the interviews. Interviews duration were approximately 1 hour. In order to overcome the validity threat of the research,

the interviews were recorded and then transcripts of these interviews were done. The participated companies and the interviewees are shown in Table 8:

Table 8 Interviewed Organizations and Role of the Interviewee

Organization	**Role of the Interviewee**
Company A	• Real-time Systems Project Director • Software Department Manager • Quality Department Manager
Company B	• Software Department Manager
Company C	• IS Department Manager
Company D	• Quality Department Manager

A total of 5.20 hours of interviews were carried out. Starting from the questions in Section 4.2, the interviews were encouraged to digress into the related subject matters. According to Maxwell (1996) the weakest part of a qualitative proposal is the data analysis part. There are memos, categorizing strategy and contextualizing strategy for data analysis (Maxwell, 1996). In congruence with the qualitative nature of the research method, no quantitative analyses were performed. Rather, the transcriptions of the recorded interviews were fractured according to the research question categories in the work notebook. Fractured data were sorted and numbered according to the research question categories. Hence, analyses of the data were done by comparing the data within and between the categories.

CHAPTER 4

CASE ANALYSIS

In this chapter, the results of the research will be presented. In order to do that the research questions will be discussed; the findings of the research will be compared to the literature. Lastly, the validity and the limitations of the research will be examined.

4.1) RESEARCH TERMINOLOGY

There are some terms used in this study explained in detail in the literature review chapter (Chapter 2):

Expectations

In this research the term, "expectations", is used for information technology investment. The definition of "expectation" and the difference from other terms such as psychological contract and requirement is defined in section 2.2.1.

IT vs. IS

In this study, for success measurement the term "information systems" is used and for investment expectation the term "information technology" is used. The reason for such use is explained in section 2.2.1.

Customer

In this study, customer is accepted as the end user of the information system. It is important to mention that the customer can be either internal or external. In either case, the customer (end user) is assumed to be different than the information system (product) developer team.

4.2) RESEARCH QUESTIONS

1) How are the studied firms practicing their information systems success measurement processes?

- What are the valid models and measurements in these firms?
- Which measures are used in these firms?
- What are the IS success factors in these firms?

2) How are the expectations for information technology investment related with information systems success?

- What are the expectations for information technology investment in the studied firms?
- How are the information systems success measurements translated to information technology investment decisions in these firms?

Based on these research questions, analysis of the relation between *"expectations for IT investment"* and *"IS success"*, and analysis of "*IS success measurement practices"* of the companies will be discussed next.

4.3) DATA ANALYSIS AND RESULTS

In this section, answers of the interviewees will be analyzed within the framework of the research questions. Main results of the study will also be discussed in this section.

4.3.1) ANALYSIS OF IS SUCCESS MEASUREMENT PRACTICES OF THE STUDIED FIRMS

In order to understand the firms' IS success measurement practices, the first research question and its subsections should be answered (Research Question 1: How are the firms practicing their information systems success measurement processes?).

The interviewees were asked "How does your company measure IS Success?", "What type of measurements does your firm use?" and "What type of success factors does your firm measure?".

Finding 1

The studied firms do not have a standardized approach for IS success measurement. They do not have a defined and documented procedure to measure IS success.

Before asking how the studied firms measure their information systems success, the question of what the information systems success means for the interviewees is asked. They replied that information systems success is:

- Doing work more efficient and effective than before.
- Concluding the projects successfully.
- Satisfying your needs with an efficient information technology.
- Maintaining the committed service level agreements.

For the information systems success measurement issue, interviewees mentioned that their organizations use some standards such as ISO 9001, AQAP 150, CMM3, and IEEE 12207; however it was not possible to hear the mention of any of the models suggested in Chapter 2 specifically for IS success measurement during the interviews. As mentioned in the literature review section, Chapter 2, several IS success models were explained such as IS Success Model (DeLone and McLean, 1992), IS Function

Performance Evaluation (Saunders and Jones, 1992), IS Assessment Framework (Myers; Prybutok and Kappelman, 1997), IS Effectiveness Matrix (Staples; Patnayanuki; Bowtell and Seddon, 1999). Some of these models were expected to be mentioned by the interviewees. Nevertheless, the interviewees specified some IS success factors which will be explained later.

Interviewees from A, B, and C specified that their organizations measure IS success. However, they failed to give specific methods or procedures how this is done. For example, interviewee from Company A said "…if a company expects success from its information system, it must be able to measure it…". However, the impression obtained from the interview was that Company A based its measurement practice not directly on CMM but rather on its own experience and interpretation. It is possible to say that Company A is away from having a standardized method or process to measure its IS success. The same situation holds for organizations B and C. The explanation for the discrepancy between the CMM3 (in fact, later CMMI-5) and Company A not applying rigorous measurement practices for its own IS effectiveness is perhaps that they focus mainly on their external effectiveness and the software they develop for their customers, rather than their internal infrastructure. It should be noted, however, that this may have improved during their process improvement and CMMI-5 certification work which took place after this research was completed.

Unlike organizations A, B, and C, organization D mentioned that they use SLAs to measure success of their information system. Company D has an internal information system; each user can define a problem immediately and follow the progress of the problem solution. It is important to cite that Company D is a multinational company. In other words, Company D imports its procedures and the way of doing business. This issue may not explain anything about non-standardization of the IS measurement process. Still, it may be a cultural difference reflected to the culture of the organizations. It is an aspect to be researched further.

Finding 2

IS success factors which are used by the studied firms overlap with the success factors in the IS literature.

These IS Success factors can be grouped according to the IS Success Model dimensions (DeLone and McLean, 1992). The IS success factors are specified by the interviewees as:

System Quality

- Quality of the network.
- Easy to integrate with other information systems.
- Reliability of the system.
- Performance of the software and the operating system.
- Productivity rate of the system.
- Decrease in problems of the early system.
- Increase in capability of producing customer orders.
- To be contemporary: Easy to upgrade the system.

Information Quality

- To be contemporary: Easy to upgrade content.
- Easy to reach the information.

Information Use

- Number of hits to the system.

User Satisfaction

- To satisfy user needs.

Individual Impact

- To do a job more efficiently than before.

- Decrease in time to complete a form.

Organizational Impact

- To reach the goals of the service level agreements.
- Decrease in time to solve problems.
- Decrease in duration of the meetings.
- Serve the business goals.
- Provide not to stay behind the rivals.
- Operate the business effectively.
- Profitability.
- Return on investment.
- Provide increase in competitiveness.
- Increase in earned-value.

Interviewees did not state all the success factors that are stated by DeLone and McLean in IS Success Model (Chapter 2: Literature Review). But, the interviewed companies covered all the success dimensions. DeLone and McLean stated in their paper (1992) that *overall success* measurement requires studying the interactions between these dimensions of the model. Therefore, it would no be wrong to say that these companies have the measures to evaluate their information systems success.

While the interviewees mentioned the system quality success factors, they also considered how to measure these success factors. At least, the interviewees were sure that the system quality success factors are measured because the interviewed companies have to measure them. System quality success factors are directly related with the end product that the customer ordered. Therefore, the companies measure their system quality by measuring success factors related with the system and measuring some factors related with the project/ end product. Below, the factors to be measured for evaluating the success of the end products are shown:

- Increase in capability of producing customer orders:
    - Number of lines of code in the ordered product.
    - Number of reviews for the ordered product.
    - Coupling rate in the ordered product.
    - Defect density in the ordered product.
    - Days stayed open of the system, which is specific to the ordered product.
    - Days stayed closed of the system, which is specific to the ordered product.
    - Number of customer complaints during the maintenance phase of the ordered product.
    - Security of the ordered product.
    - Robustness of the ordered product.
    - Number of customer product change orders.
    - Advance in on time finishing of the ordered product.
    - Profit gained from the ordered product.

Based on the Company A, B, C, and D's IS success factors grouped according to the IS success dimensions, it can be said that these organizations mainly focus on two dimensions: system quality and organizational impact. This finding complies with the findings of Lester and Willcocks (1997): The IT managers divide their IT evaluation into two parts: technical efficiency or project evaluation and business related performance (section 2.1.2). The actors of this study are IT managers, and they try to measure the factors of the two parts: technical efficiency or project evaluation and business related performance. From this finding, it can be said that the IS managers in our case study share a common view with their contemporaries when the issue is evaluating IS success.

Finding 3

The interviewees from the studied firms failed to give detailed information about how they measure IS impact on organizational performance.

This situation can be decoded with alternative explanations. Three out of four alternative explanations why the interviewees failed to give detailed information about how they measure IS impact on organizational performance are related with research limitations. These three alternative explanations can be added to the group of explanations that explains why the interviewees failed to give detailed information about some of the questions. These alternative reasons will be considered in the *Limitations of the Research* section (section 4.5) below.

Although the interviewees did not specifically mention it, that the studied firms may be experiencing difficulties in measuring organizational impact factors. This alternative explanation can be supported with the findings in the literature. The interviewed companies face the same difficulty when they are measuring their information systems impact on their organizations, as do their contemporaries in the literature. This suggestion has been validated by the members of three out of the four studied firms.

Seddon et al. (2002) state that according to managers, the most difficult issue about measurement is to measure the organizational impact of information systems. The same difficulty stands for when managers want to measure the IT investment impact on organizations (Kohli and Sherer, 2002).

As mentioned above, except company D, the companies failed to give enough information about the impact of information system to the organization or the impact of information systems investment to the organization. However, this difficulty exists in the other countries' companies. According to Lester and Willcocks (1997), business-related measures are still the least commonly used among the European companies. Yet, their study also reveals that business related measures are the fastest evolving measures. Since, the author is not familiar with any studies about the organizational impact success factors in Turkish companies, it has not been possible to compare the findings of this research with the past ones.

As a conclusion, based on the interviewee answers, the following points have emerged on research question 1:

- The studied firms recognize success factors, which are similar to the success factors in the literature.
- The studied firms' IS success factors are mainly grouped under the system quality and organizational impact dimensions. The same situation holds for the firms' contemporaries.
- The studied firms are experiencing difficulty when they try to measure the organizational impact of the IS. The same difficulty exists in the studied firms' contemporaries.
- The studied firms do not have a standardized procedure to measure the success of their information systems. It is possible to say that they rather have a heuristic approach when they are measuring their IS success.

4.3.2) ANALYSIS OF RELATION BETWEEN EXPECTATIONS FOR IT INVESTMENT AND IS SUCCESS

In order to analyze the relation between expectations for IT investment and IS success, the question of what are the expectations for information technology investment in the firms and the question of how the information systems success measurements are translated to information technology investment decisions in the firms should be answered (Research Question 2).

4.3.2.1) EXPECTATIONS FOR IT INVESTMENT

Based on the interviews, it becomes possible to divide the expectations for IT investment into two major areas. The first one is project based (specific) expectations for IT investment and the second one is the general (common) expectations for every IT investment.

Project Based (Specific) Expectations

All of the interviewees mentioned that most of the time IT investment needs emerge when their customers want to buy software. To be able to develop that software these firms have to buy new tools or software specific to the ordered customers' products. In other words, customer products are created and supported in the environment of new tools and programs. In this circumstance, it is the required product, which forms the expectations for IT investment. Hence, these expectations can be classified as project based expectations for IT investment. Thus, project based expectations of IT investment are the functions of the investments. Therefore, the investments should satisfy the requirements of the ordered product. Each project will require different functionalities, which are specific to the product. Even there are times that these firms do not have the opportunity to select the type of IT investment because as a part of the contract, customers may oblige these firms to buy specific programs. Therefore, the expectations for IT investment, which are based on the functionalities of invested tools and programs, change from project to project.

General Expectations

Unlike project-based expectations for IT investment, general expectations for every IT investment are same for every project or situation. The interviewees mentioned these expectations for IT investment as:

- Increase in effectiveness and efficiency of doing work.
- Enable doing work in shorter time than before doing that work.
- Decrease in the workload.
- Number of change request for the product from the customer.
- Compliance with the business goals of the firm.
- Security of the system.
- Robustness of the system.

- Cost of the investment.
- Realizations of the project based expectations.
- Return on money.
- Return on effort.
- Easy to implement and maintain the system.
- Easiness of learning the system.
- Easiness of using the system.
- To have an easy to use user interfaces.
- Compatibility of skills of the users to the system usage requirements.
- Additional tools coming with the bought IT in the form of promotion.
- Technical support of the IT provider.
- Existence of call center of the IT provider.
- Commonality of the system usage in the industry.

General expectations do not depend on the type of investment. Although the general expectations for IT investment may vary from firm to firm, the firms require the same general expectations for their IT investments. In other words, whatever the project specific expectations are, the interviewed firms have the same general expectations from investments to be realized at the end of the investment implementation period. The variation in general expectations may be caused by the culture of the organization and/or the management of the organization.

Factors that form "expectations for IT investment"

Another important aspect about the expectations for IT investment is the factors that play role in forming these expectations. Based on the interviews, it becomes possible to say that there are three factors, which affect the determining of the expectations for IT investment. They are 1. the industry/cluster that the firm is in, 2. the customer that the firm provides service to, and 3. the firm itself.

The interviewee from Company A stated, "…There are standards that our industry follows. When we invest in a new system or measure success of our system, we expect the results to be above the industry accepted standards…" The second factor is mentioned by the interviewee from Company C as "… Our IT investment expectations are formed by the contract made between the customer and our firm as well as by the standards of our industry…" The interviewee from Company D stated last factor "…We have company-wide SLAs for every process. For example, in our company, IT investment success is always measured by the key success factors, one of which is profitability. And, in our company we measure profitability with EBIT or EVA. Now as a company policy, in order to accept that IT investment is successful, it is expected that the SLA of EBIT be above 80 percent. In other words, if the profitability exceeds 80 percent, the IT investment is assumed to be successful…"

Expectations for IT investment is one side of the analysis, the other side is IS success. According to the interviewees, in order to say that the information system is successful, the information system should satisfy the IS success dimensions mentioned before. Of course, the priority of the dimensions varies from organization to organization. The IS success dimensions form a base for IS success measurement. However, the expectations for IT investment determine which of the IS success dimensions should be taken into consideration and be measured.

Finding 4

There are two types of IT investment expectations and the industry, the customer and the firm are the three factors that shape the expectations for IT investment of the firm.

It is important to be aware of these factors when determining the expectations because each factor has its own aspects to be reflected in the expectations for the IT investment. Moreover, it is important to differentiate the expectations by its determining factor because by this way it will be easy to see the expectation gaps (Raymond, 1991) or in other words it will be easy to see the expectation performance discrepancy

(Bahattacherjee, 2001). It is important to mention that the customer can be either internal or external. In either case, the customer (end user) is assumed to be different than the product developer team. To sum up, it is possible to say that firms have two types of IT investment expectations and there are three factors, which affect the IT investment expectations.

The table below shows some examples of the type of expectations and the factors that affect the expectations:

Table 9 Examples of type of expectations and factors that form "expectations for IT investment".

	Industry/Cluster	**Customer**	**Firm**
General Expectations	System usage popularity among the industry firms	Easiness of learning the system	Profitability
Project Based (Specific) Expectations	Standards accepted industry-wide (i.e. CMM, AQAP, IEEE)	Security	# of Customer complaints

Finding 5

Studied firms have operational type of IT investments. They invest in information technology for operational purposes.

According to Kohli and Sherer (2002), there are three types of IT investment: Operational IT, Managerial IT and Strategic IT. Besides the reasons of investment, organizational impact of the information technology can help us differentiate the type of the investment (Chapter 2: Literature Review).

Why is it so important to identify the IT investment type? Because it is important to justify the investment and in order to justify the investment, companies have to measure the impact of the investment. Therefore, by looking at the measures it is possible to say for what purposes the company has invested in IT. Therefore, if we decide on the type of investment, we can understand the expectations for that IT investment.

When we look at the measures that the case subjects are using for IS success measurement, we see that the firms try to measure the profitability and return on investment. Profitability and return on investment are mainly calculated for measuring operational IT investment impact in the organizations (Kohli and Sherer, 2002). Weill and Olson (1989) define this type of IT investment as transactional IT investment (Section 2.2.2). However, Weill and Olson define another important type of IT investment: Industry-based Threshold Investment. As mentioned in Section 2.2.2, this type of investment is done for to enter the industry or compete or remain in that industry. Therefore, the measures such as not to stay behind the rivals or to increase in competitiveness show us that the firms invest for industry-based threshold IT investment purposes, also.

As a conclusion, the type of measures shows the type of investment and the type of investment shows the purpose of the investment. We can say that the studied firms invest in IT for operational management purposes with short-term returns and expectations. As it happens in the case of transactional or operational IT investment and industry-based threshold investment.

4.3.2.2) RELATION BETWEEN EXPECTATIONS FOR IT INVESTMENT AND IS SUCCESS

Based on the interviews it can be said that expectations for IT investment play a crucial role in the success of IS. It is true that it is the IT investment, which provides the new system and directly affects the success of the system. However, it is the expectations for

IT investment, which determine the type of IT investment. Hence, expectations for IT investment play a role in the success of the information system. As mentioned in Literature Review (chapter 2), success of the information system can be understood by measuring the system against its success dimensions. These success dimensions to be measured emerge when the firm makes the IT investment decision. Expectations for the IT investment are determined at the investment decision-making process stage. Then, these expectations are used in determining process of the success dimensions to be measured. Interviewee from Company A explains this process "…When we define our expectations for IT investment, actually our expectations draw a path for us. This path forces us to apply a specified procedure…"

Consequently, expectations for IT investment are important because they constitute a base for the investment requirements. Moreover, these expectations are used for the comparison of realized expectations. The realized expectations show the success of the implemented system. Therefore, to understand the success of IS one must compare the expectations to the realizations. The comparison process will reveal if the implemented system is successful and show the expectation gap, if there is any.

For example, the interviewee from Company D stated that they expected X % decrease in the workload before IT investment. After the IT investment implementation, they compared the expected decrease in workload with the realized decrease in workload. And since the realized decrease in the workload was in the accepted range, they thought that their new system was successful. Of course, only one realized expectation may not generally be considered as sufficient indication of IS success. However, the Company D's only or main reason to invest might be the decrease in workload. Hence, even only one expectation realization might have caused the Company D to call their system successful.

The relation between the expectations for IT investment and IS success can become clear with the real life experiences of the interviewees. The interviewees are asked

whether they have IT investments, which are unsuccessful or unsuccessful in some aspects and if they have such examples what they think about the reasons of the failures. Company A gave an example from their information system. It is a new system developed by Company A and used for Company A's internal operations. The interviewee accepted the fact that the system users showed very strong resistance to the system. In order to overcome this resistance, they had to give long-term trainings to the users. Company A's experience shows that how it is important to determine the expectations of the customers.

The interviewee from Company A defended another their unsuccessful investment example as "….Our expectations were clear for the product, however, the information given about the product at the buying phase was different than the reality. Therefore our investment became obsolete…." However, when this example is discussed with the interviewee from Company B, he refused the excuse of interviewee from Company A. He argued that products have trial periods, and after the trial periods, it is possible to abandon the buying decision. Therefore, it is possible to conclude that the Company A was not sure about their own expectations for the product when they were at the buying phase of that product.

A similar example comes from Company B; the interviewee stated, "…We bought a tool for a project however, we realized that we did not need that tool. This happened because the customer did not express his expectations clearly…" As a result of this, Company B had to invest in another tool to develop the ordered product. The firm incurred loss because of a useless tool investment. Although the customer may not specify their expectations clearly, it is the product developing firm's responsibility to understand the customer's expectations for IT investment. If the expectations of the end-users/customers had been identified correctly, there would not have been this kind of difficulties such as cost or user resistance to be overcome in the way of IS success.

The interviewee from Company D gives another unsuccessful IT investment example. The company needed to change one module of their system, since it was not satisfying their needs anymore. They decided a product, prepared the necessary IT infrastructure but the international management office did not let them to implement that product (There are specified systems that the international branches have to use.). In order to provide their immediate needs, they had to invest 80.000 dollars for another product. However, the center office required the department to use a new system, which is implemented, in every international branches of the company. It was a 1.4 million dollar system and the department cannot use it effectively. Now, there are two systems in the department and both systems do not exactly satisfy their needs. This situation occurred because the expectations of the department conflicted with the expectations of the center office of the multinational company. However, it is for sure that the both parties did not try to grasp the IT investment expectations of the other side. And they had to use the system that the international management office required. Moreover, he stated, "…It is not because that the expectations are not expressed clearly but it is because expectations are the results of "*today"*. And with the today's expectations you try to buy a tool of *"future"*, which is two years ahead…".

Finding 6

The studied firms would not have made unsuccessful IT investments if they had elaborated their expectations for IT investment better.

It is true that the companies try to anticipate their future needs from an IS with their current expectations for IT investment. However, as mentioned before, ambiguity will be minimized if the expectations for the IT investment of the company itself are formed more clearly. Therefore, based on the unsuccessful IT investment examples above, it is possible to say that any deficiency of any type of the factors in determining the expectations for IT investment will lead to problematic information systems, even to unsuccessful information systems and obsolete IT investments. As Rosenberg et al. (1998) argued that the organizations should catch the errors during the system

development as early as possible (i.e. at requirements specification phase) in order to have a successful IS. Ginzberg (1981) complies with this argument by mentioning that pre-implementation expectations can be used as an early warning indicators for IS implementation outcomes. Therefore, it is important to catch errors, even before requirements phase, at expectations for IT investment specifying phase in order to have a successful system. Of course, it should be said that there are determinants other than expectations for IT investment which also influence the IS success.

Conversion Effectiveness

Weill and Olson (1989) defined *"conversion effectiveness"*. According to Weill and Olson (1989), the effectiveness of the IT investment conversion to a useful output varies from one organization to another. Weill and Olson argue that the implementation process of the IT investment, the culture of the organization and the skill of the managers are the key determinants of the conversion effectiveness phenomenon. Ginzberg (1981) support this view that the quality of the process of implementation as a major determinant of the success of implementation.

Based on the finding 6, it is possible to say that how well the expectations are expressed for IT investment can be added to the determinants of the conversion effectiveness of the IT investment. As mentioned before, there are three factors, which are the industry, the customer and the company itself form the expectations and each of the factors has its expectations for IT investment. Both the conversion effectiveness determinants and the expectations for IT investment are the key ingredients of IS success.

Finding 7

Expectations for IT investment have an effect on the success of information system in the organizations.

If there is a relation between the expectations for IT investment and IS success, it was probable that the studied firms might have defined such a relationship. Therefore, the interviewees were asked "What is the threshold, if any, level of realization of your expectations for IT investment for you to consider your IS is successful?". The companies responded as: Company A: 50%; Company B: 100%; Company C: 70%; and Company D: 75-80-90-96%. Naturally, these percentages have different meanings for each interviewee. Company A stated that the overall realization percentage must be at least 50%. Unlike Company A, Company B stated that some of their expectations are mandatory, that is, some of their expectations, such as realization of project based expectations and cost of the investment, must have 100% realization. Like Company A, Company C targets an overall realization percentage of its expectations as 70%. Lastly, based on the type of the IT investment, Company D stated varying target realization percentages such as 75-80-90-96 %. Unlike other companies, Company D specifies different percentages for different expectation items. The overall success of the information system is decided according to the cumulative realized success of the expectations. For example, if aim is to evaluate their investment from the EBIT perspective, Company D expects it to be at 80% level to accept the investment successful. However, as mentioned before, the realization percentage has different meanings for each firm, therefore a valid comparison can be done in more general terms.

However, the interviewees did not give the specific items for the IT investment expectations. This may have been because the studied firms have a tendency to evaluate the project-based success of their information systems.

The relation between expectations for IT investment and IS success is not one side but mutual. In other words, the IS success affects the expectations for IT investment. When evaluating the IS success, lessons learnt during the investment process will be formed. These lessons will affect the further expectations for IT investment. We can show this relationship in a diagram:

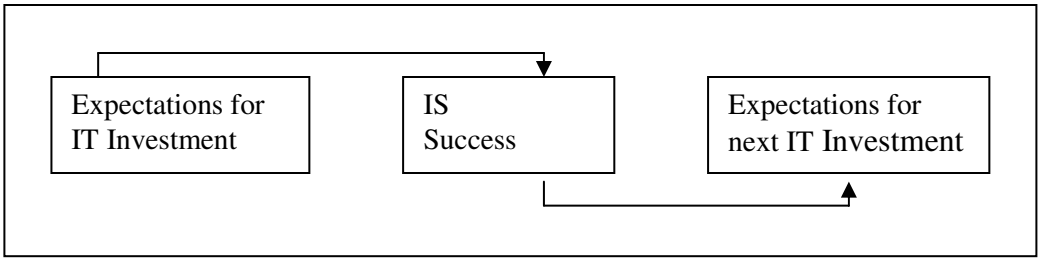

Figure 7 Relation between expectations for IT investment and IS success

Finding 8

As depicted in Figure 7, IS success affects the expectations for next IT investment. The arrow from expectations for IT investment to IS success shows that specifying expectations before IT investment affects success of the implemented system. This relation is supported by the interviews.

For example, the interviewee from Company A stated, "…Compared to what would we check our information system? How can we observe the improvement in our system? Therefore, we select the measurement metrics. These metrics are based on our previous investment experiences…" Another example came from interviewee from Company B who supported this view, "…Based on the lessons learnt from our previous projects, we decide the metrics, which will measure the success of the new system. Then we compare the metric results of the historic and the recent data. Hence, we can decide that our new system is successful, and sometimes we realize some of the metrics we picked are not meaningful enough to measure the success of our new system…"

The arrow from IS success to expectations for IT investment shows that feedback from success of the system affects the next IT investment expectations specification. In other words, lessons learnt from the former investment process -a process includes the decision making of investment, specifying expectations, IT investment, IT implementation and measuring the success of the system- is reflected in the latter expectations for IT investment.

As a conclusion, based on the interviews, the following points can be stated regarding the research question 2:

- The studied firms have operational/transactional and threshold type of IT investments.
- The studied firms have two types of expectations for IT investment: general and project based (specific) expectations.
- The unsuccessful IT investment examples of the studied firms showed that if the firms had defined their expectations much clearly, they would not have had obsolete IT investments.
- Expectations for IT investment affect the success of the IS of the studied firms.
- The success of the IS affects the next IT investment expectations of the studied firms.

4.4) VALIDITY OF THE RESEARCH

According to Maxwell (1996), there are three types of validity threats in qualitative research:

- Threat to valid description: This type of validity threat is "the inaccuracy and incompleteness of the data". In order to overcome this validity threat, every interview was recoded. The transcriptions were obtained from these interview recordings.

- Threat to valid interpretation: This type of validity threat is "forcing one's own framework instead of understanding the views of the people studied and the meanings they give to their words and actions". In order to overcome this validity threat, asking leading questions were avoided to interviewees. Open

ended questions were used and the interviewees were made to speak most of the time during the interviews.

- Threat to valid theory: This type of validity threat is "not collecting or paying attention to discrepant data, or not considering alternative explanations". In order to overcome this type of validity threat, the interview questions were directed to the interviewees from four different firms (multiple-case study). Similar and different answers were grouped under each question. This helped to come up with alternative explanations for the research questions in the "Data Analysis and Results" section (Section 4.3).

4.5) LIMITATIONS OF THE RESEARCH

Main limitation of the study is that the results do not apply generally. Since the qualitative research method is used for this study, generalization of the results was not the purpose. According to Maxwell (1996), there are two types of generalizability: internal and external generalizability. Internal generalizability is defined as generalizability of a conclusion within the setting or group studied. On the other hand, external generalizability is defined as the generalizability of a conclusion beyond the setting or the group studied. The internal generalizability is the important issue for qualitative research and, therefore, internal generalizability was aimed for in this study. However, because of the nature of the qualitative research method, it has not been possible to make external type of generalizations about the IS success measurement habits of other firms in Turkey or relation between IS success and expectations for IT investment in other firms in Turkey.

Lastly, some of the research questions have not been answered with enough details i.e., although organizational impact dimension's success factors were mentioned, interviewees failed to answer how they measure these factors. There may be three reasons for this. The first reason can be that the researcher did not lead her interviewees

speak to about the details of the interview questions. The second reason may be asking the questions to the wrong interviewee. Since resources were limited, it could not be possible to interview more people. Therefore, sometimes the interviewed person did not have the expertise to answer some questions. When particular interviewees were unable to respond to a certain question it was possible for them to redirect the interviewer to other personnel. This, however, happened rarely. Moreover, even when an interviewee did not know how exactly the measurements were taken; he or she would be expected to have some awareness of the measurement program and its purposes, if such a program did exist. Lastly, the interviewed person failed to give a satisfying answer because there is no practical experience in the related firm regarding that question. In other words, the issue stands as a "name" in the organization but nothing is done to deal with that issue. Therefore, the interviewee did not have any detailed information about that question.

CHAPTER 5

DISCUSSION AND CONCLUSION

In this thesis, information systems success measurement practices of four firms in the software/defense industry were analyzed by using qualitative research method. The relationships between *expectations for IT investment* and *IS success* in these firms were also analyzed. As data collection method, interviews were used. Interviews were done with: 2 Quality Management Dept. Managers, 1 IS Dept. Manager, 2 Software Engineering Dept. Manager and 1 Project Manager (6 Managers). The studied firms are some of the frontier technology firms in Turkey. These firms have all completed many projects with huge amount budgets successfully. They develop software, information systems, implement hardware and give IS consulting services for their customers. These firms' headquarters are in Ankara (except Company D); these firms do business most of the time for defense industry. These firms were chosen as research sample for this thesis, because they are familiar with the concepts of information systems success and information technology investments. This assumption has originated from these firms' experiences in information systems and information technologies. Based on the literature (Chapter 2) and the data gathered from interviews, the research questions were evaluated (Chapter 4).

5.1) MAIN RESULTS OF THE THESIS

In the thesis, the aim was to understand the two main issues: information systems success measurement practices of the studied firms and the relation between these firms' expectations for IT investment and their IS successes.

5.1.1 INFORMATION SYSTEMS SUCCESS MEASUREMENT PRACTICES

This study showed that studied firms are measuring their information systems success. In order to measure their information systems, they use some success factors. These IS success factors are similar and comparable to those mentioned in the literature, i.e. DeLone and McLean IS Success Model (Chapter 2 and Chapter 4). However, when the success factors were grouped according to the dimensions of IS Success Model of DeLone and McLean, it was seen that most of these success factors are mainly grouped under the two IS success dimensions: system quality and organizational impact. This finding complies with the findings of Willcocks and Lester (1997). The studied firms' contemporaries in Europe measure business related performance and technical efficiency or project evaluation.

Moreover, this study revealed that unlike system quality, the interviewed firms failed to give details of how they measure organizational impact success factors. This finding is explained as the studied firms are experiencing difficulty in measuring organizational impact success factors (In the case of leaving out alternative explanations mentioned in section 4.5.). This finding also holds true for the findings of Seddon et al. (2002), Kohli and Sherer (2002), and Willcocks and Lester (1997).

Lastly, this study showed that studied firms are far away from having a procedure or standardized process for measuring their information systems success. It is important to mention that although there are IS success models in the literature, there are not standardized IS success measurement practices. Even when firms do have such standardized measurement practices, these practices are expected to be different based

on the purpose or aim of measurement and selection of metrics according to the aim of measurement. It seems that the firms fill the absence of a measurement procedure with the standards such as ISO 9001, AQAP 150, IEEE 2207, and CMM3 level. However, IS success measure is far from being a strategy or policy for these firms. It is possible to say that the studied firms focus on providing the requirements of the customers (mostly the national defense ministry) who require the firms to obtain those standards, in order to win the bidding of the projects. Therefore, it is possible to conclude that if the infrastructure (information systems) enables these firms to develop their ordered product, there is no need for measuring individual contribution to the users of their information systems of studied the firms or measuring organizational contribution of their information systems to their firms, if there is any. This point of view of the studied firms is observed during the interviews. Only company D mentioned *service level agreements*, which specify percentages for the success factors to be realized, in order to accept their system successful. At this point, it seems very crucial to point out that Company D is a multi-national company. The culture of the headquarters may shape culture of the firm D in Turkey. This culture may be reflected in having a procedure that takes into account measuring the IS success of the firms.

5.1.2 RELATION BETWEEN EXPECTATIONS FOR IT INVESTMENT AND IS SUCCESS

The study showed that the studied firms have expectations (higher level, implicit and mostly unwritten) for their IT investments. Expectations differ from requirements in the sense that requirements of IT or of IS development are lower level, explicit and written items. Although expectations are not mentioned in the specification documents of IT investment, the study showed that expectations of the studied firms play an important role when these firms want to invest in information technology. Based on the nature of the expectations, the expectations were divided into two: project specific expectations and general expectations. Some of the general expectations, which were salient expectations during the interviews, were the *technical support of the IT supplier*,

existence of call center of the IT supplier and *commonality of the system usage in the industry*. The interviews revealed that these firms' expectations are affected according to three factors: the industry, the customer and the firm itself.

However, "*expectations for IT investment"* is an issue, about which few resources were found in the literature. Therefore, in this thesis, it has not been possible to compare the findings with the literature.

This study revealed that the studied firms invest in information technology for operational purposes. There are three types of IT investment: operational IT, managerial IT, strategic IT (Kohli and Sherer, 2002). It is important to identify the types of IT investments of the studied firms because understanding the expectations for IT investment of these firms becomes easier. Therefore, it is possible to say that by investing operationally the studied firms target short-term returns and expectations. This view of the studied firms verifies why these firms can give details about measuring their systems quality but why these firms cannot give details about measuring organizational impact of their systems. Since the studied firms view of measuring their information systems success is restricted to measuring the success of the project or product to be completed, these firms focus on type of investments (operational IT) that solve their immediate IT investment needs required by the ordered project/product.

Moreover, the study showed that success of their information systems depends on the realization of their expectations for IT investments. The studied firms' real life examples showed that these firms would not have experienced unsuccessful investments if they had determined their expectations for IT investment better.

Lastly, the study revealed that there is a relation between the studied firms' *expectations for IT investment* and their *IS success*. Expectations for IT investment affect the studied firms' perceptions of their systems successes when the investments become part of their existent information system. These firms mentioned that they compare the expectations

for IT investment items (items specified before IT investment) with the information system success items (items after the IT is invested and becomes a part of the existent information system). Moreover, they define realization percentages for their IT expectations in order to call their IS successful. It is possible to conclude that these firms' IS successes affect the expectations for their future IT investments. The lessons learnt from the previous investment and their contribution to IS success is reflected in the next IT investment expectations.

As an overall conclusion, the studied firms do not have managerial and/or strategic perspective when the issue is the IT investment or measuring IS success. These firms focus on the operational and daily-based issues. It is hard to talk about long term planning for IT investment. Also, it is hard to say that the studied firms realize the importance of their information systems' impacts on their organizational success. This point of view of the studied firms is reflected to their measuring IS success. They are mostly interested in the success of their systems quality, which is directly related with the success of the ordered product or project. Therefore, it is difficult to say that the studied firms have the strategic approaches to obtain the success of their information systems.

5.2) FUTURE RESEARCH OPPORTUNITIES

As a continuation to this study, factors used by the studied firms for assessing the success of information systems can be evaluated for firms in other industries. The validity and the scope of the IS success factors can be analyzed for the information systems of banking, health, manufacturing industries as well as other companies in software/defense industries.

Moreover, expectations for IT investment can be evaluated for firms in other industries. The validity of these expectations can be analyzed. The differences and similarities of

the expectations between the industries can be analyzed in order to reach a list, which includes expectations for IT investment of every industry.

A detailed research can be designed in order to understand the organizational impacts of information systems on the firms in Turkey. Also, a detailed study can analyze which of the alternative explanations (given in finding3, section 4.3 and section 4.5) stand behind why the studied firms failed to give details about how they measure their organizational impact of information systems success. Additionally, a study can be done to analyze if there is any relation between the culture of the organizations and their standard procedure establishments for IS success measurement (mentioned in finding 1, section 4.3). In the case of the existence of a relation between culture of the organizations and the IS success measurement approach of the firms, a study can be done to understand the effects of the organizational culture on IS success measurement approach and/or the participants role in the affection mechanism of the organizational culture to the IS success measurement approach. This kind of study can reveal the differences between the management groups in different departments in the same firm and/or between the firms in the same industry and/or between the industries and /or between the firms from different country origins operating in Turkey.

This study can be an important first step for understanding the expectations for IT investment and IS success measurement practices of Turkish companies. An augmented form of this research (including greater number of firms in Turkey) would contribute to IS success literature. The findings, which can be externally generalized, can contribute to the Turkish companies. They can utilize the results of such a research in the form of creating their unique IS success measurement approach and their unique effective IT investment approach. Moreover, such a study can provide Turkish companies to see the differences and similarities between in the case studies of their contemporaries in developed countries. By comparison, Turkish companies can manage to convert their weaknesses into strengths. Lastly, this type of research will contribute especially to the literature of IS success and IT investment in the developing countries, since there is very

limited number of case studies for developing countries in the literature. This kind of an augmented research can be a valuable resource when evaluating the similar studies in developing country context.

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