**INFORMATION SYSTEM EFFECTIVENESS
ASSESSMENT FRAMEWORK
FOR
THE TURKISH ARMY**

**A THESIS SUBMITTED TO
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Approval of the Graduate School of Informatics.

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ABSTRACT

IS EFECTIVENESS ASSESSMENT FRAMEWORK
FOR
THE TURKISH ARMY

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The primary purpose of this study is to develop a methodology that can be used to assess IS effectiveness in the Turkish Army. This study starts with the review of the information system effectiveness and assessment paradigms. Afterwards, influences of the characteristics of the Turkish Army on IS effectiveness assessment techniques are investigated. Observations and interviews are determined as the favorable data collection techniques. A user perceived effectiveness assessment instrument for semi-structured interviews is developed. Then a case study is applied to assess IS effectiveness in one of the units of the Turkish Army. At the end of the thesis, a qualitative assessment methodology based on maturity and key determinants of a successful IS are proposed for the Turkish Army.

Keywords: Information System, Organizational Characteristics, Effectiveness Assessment, Qualitative Research, Maturity Based Assessment

ÖZ

TÜRK KARA KUVVETLERİ İÇİN
BİLGİ SİSTEMİ ETKİLİLİĞİ ÖLÇÜM/DEĞERLENDİRME
ÇERÇEVE ÇALIŞMASI

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Bu çalışmanın temel amacı Türk Kara Kuvvetleri'nde kullanılabilecek bilgi sistemleri etkililiği ölçüm metodolojisi ortaya koymaktır. Çalışma, bilgi sistemi etkililiği ve ölçümü modellerinin incelenmesiyle başlamaktadır. Daha sonra, Türk Kara Kuvvetleri'nin özelliklerinin etkililik ölçümüne olan etkileri üzerinde detaylı çalışma sunulmaktadır. Gözlemler ve görüşmeler uygun bilgi toplama teknikleri olarak belirlenmiştir. Yarı yapılandırılmış görüşmeler için kullanıcı temelli etkililik ölçüm aracı geliştirilmiştir. Türk Kara Kuvvetlerinin bir kurumunda bilgi sistemleri etkililiği ölçümü vaka çalışması yapılmıştır. Tezin sonunda, Türk Kara Kuvvetleri için olgunluk temelli nitel ölçüm metodolojisi ve başarılı bir bilgi sistemi için temel belirleyiciler önerilmektedir.

Anahtar Kelimeler: Bilgi Sistemi, Örgütsel Özellikler, Etkililik Ölçümü, Nitel Araştırma, Olgunluk Temelli Ölçüm

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LIST OF ABBREVATIONS AND ACRONYMS

BPR	**:**	**Business Process Reengineering**
C2	**:**	**Command and Control**
CEO	**:**	**Chief Executive Officer**
CIO	**:**	**Chief Information Officer**
D&M	**:**	**DeLone and McLean**
GDSS	**:**	**Geographic Decision support System**
IS	**:**	**Information System**
IT	**:**	**Information Technology**
NATO	**:**	**North Atlantic Treaty Organization**
NBS	**:**	**Nizamiye Bilgi Sistemi**
OBS	**:**	**Otomatik Bilgi Sistemleri**
PBS	**:**	**Personel Bilgi Sistemi**
RBS	**:**	**Revir Bilgi Sistemi**
ROI	**:**	**Return on Investment**
SERVQUAL	**:**	**Service Quality**
TCP/IP	**:**	**Transmission Control Protocol/Internet Protocol**
TPS	**:**	**Transaction Processing System**
VHKİ	**:**	**Veri Hazırlama Kontrol İşletmeni**

CHAPTER 1

INTRODUCTION

With the increasing expenditures on computers and computer based information systems, evaluating investments in information technology and assessing the information systems effectiveness have become critical issues for both IS practitioners and researchers since the 1970's [Kumar, 1990; Yuthas and Eining, 1995; Scott, 1995;Khalil and Elkordy, 1996;Ferrat and Agarwal, 1996]. While there is evidence that information technology is one of the keys to competitive advantage, there is also evidence that IT investments do not necessarily provide the expected advantage to organizations. So, IS departments are finding that they have to demonstrate their worth in an increasing emphasis on evaluation in order to support IT [Drury and Farhoomand, 1998; Rau, 2004].

IS effectiveness is defined as the extent to which a given information system actually contributes to achieving organizational goals, i.e., its effect on organizational performance [Thong et.al, 1993]. Following this definition, one concern in assessment trend is determining system value, particularly the system's impact on organizational effectiveness. As researchers argue, that is a very complex issue for organizations as organizational factors besides the information system contribute to organizational performance [Newcomer and Caudle, 1991]. Initial attempts at evaluation of information systems have been made in terms of return on investment (ROI), on the other hand, there

are no reliable methods of making a quantitative cost-benefit evaluation of information systems, and thus, evaluating the success of information systems has long proved to be elusive.

The need to evaluate effectiveness and the difficulty of operation in an economics based cost-benefit construct, accelerated the search for constructs that could be identified and more easily measured like user satisfaction [Drury and Farhoomand, 1998]. It should be noted that user satisfaction is perceptual and attitudinal in nature and satisfaction questionnaires generally seek to address whether the respondents perceive the information provided by the system useful or not [Yuthas and Eining, 1995]. On the other hand, because of lack of theoretical basis and complex metrics, user information satisfaction has not resulted in well-accepted methodologies [Melone, 1990].

Despite the efforts by the IS researchers, the conditions for a successful implementation of an information system are not still adequately understood and there is still debate among the researchers how IT contributes to organizational performance. There is little understanding of the actual process that brings in effective IS and there is no structured framework to map and understand the causal relationship [Melville, 2004].

Recent attempts to clarify IS effectiveness have led to the conclusion that different systems have diverse properties which affect success evaluation. Since IS structure is significantly correlated with organizational structure, different IS structures naturally fit different organizational contexts and success depends on the extent to which the particular values fit the organizational environment [Raymond, 1990]. It is clear that a single measure of IS success is unlikely to be sufficient. Therefore, a composite of different overall measures is the only plausible means of defining the construct and overcoming the disagreement about a single measure [Abreu and Conrath, 1993].

We may conclude that the structure of any information system in any organization is consistent with the needs, culture and the past of the organization with different subsystems [Bilgen, 2003]. Therefore, the specific criteria and assessment techniques are likely to differ from one organization to another and it is inevitable for each organization to construct its own evaluation methodology making use of generally accepted generic studies on IS effectiveness assessment considering the organizational characteristics.

1.1 Turkish Army within the Scope of IS Evaluation

For the Turkish Army, as an organization founded in 209 B.C., claiming that information systems effectiveness is a very recent issue is unacceptable. On the other hand, despite the successful practices of manual information systems in the history of the army, it is high time we interrogated the effectiveness of information technology investments on computer based information systems. Because the obvious concern on this issue is that, the Turkish Army's investments on information technology are increasing. In order to implement and to use the systems effectively, we are able to observe and study the practices that other countries have experienced for decades.

It should be noted that the current IS effectiveness assessment literature is generally constructed on private business practices and studies from some other countries. Besides the economical differences between Turkey and other countries, The Turkish Army has some specific characteristics: It

- is a public organization,
  - ➢ its benefits cannot be priced in the market,
  - ➢ it operates under certain legal and formal constraints,

> ➤ personnel attitudes are different from the ones in private organizations.

- • is an active army operating over diverse geographies,
  - ➤ the Turkish Army has some diverse and intangible goals,
  - ➤ organizational culture of the Turkish Army is different from other organizations,
  - ➤ reduced cost does not usually mean performance improvement for the military.

- • is comprised of Turkish People, so the army personnel exhibits Turkish national characteristics.

Hence, in this study, the characteristics outlined above will shape the evaluation methodology and effects of those characteristics on IS effectiveness assessment will be discussed in detail in the third chapter.

1.2   Problem Statement

There are two main streams in IS effectiveness assessment literature. The first one is trying to measure impacts of IS on organizational performance, the second one is to use surrogates or easily measurable variables like user satisfaction or system use to understand the perceived effectiveness. The first way is preferred by the organizations with concrete goals like a certain amount of profit or product. Many organizations use the second way, an attitudinal measure toward the use of the results of information systems. It should be noted that the second way has some inherent theoretical problems because of users' inconsistent attitudes. The problem with the Turkish Army in this context is that, as one of the largest organizations in the country, it has some diverse and sometimes intangible goals, so it may be problematic to attempt to quantify the benefits. On the other hand, user perceived effectiveness assessments just performed by questionnaires in a quantitative

manner may not reflect the realities because user satisfaction studies are prone to errors caused by users' attitudes and there is no former study on users' attitudes towards IS in the Turkish Army. Consequently, limitations of IS assessment paradigms in general and the characteristics of the Turkish Army in particular require an intensive study to propose an evaluation methodology. As a result, the main objective of this study is to put forward a methodology to assess IS effectiveness for the Turkish Army considering its specific organizational characteristics.

1.3 Research Method

In the first phase of the study, the literature concerning private business IS effectiveness assessment works published between 1970 and 2004 has been investigated. In the literature review stage, assessment paradigms and techniques in the scope of their capabilities versus limitations were compared. In addition to those, in this phase, organizational factors that influence IS effectiveness were studied. At the end of the first phase, it was determined that there is no generic framework for every organization and every organization evaluates IS effectiveness according to its organizational mission and specific attributes.

In the second phase, likely effects of organizational characteristics on IS effectiveness assessment were discussed. In this phase, studies and theses on the Turkish Army's organizational culture including effects of national culture and personnel attitudes as well as the current international IS literature were examined. At the end of this phase, the question of "How do organizational characteristics affect IS effectiveness assessment?" was answered for the key evaluation paradigms and techniques identified in the literature review.

In the third phase, considering the previous phases, DeLone and McLean Model was justified as the basis of the research. DeLone and McLean's

model of IS success is accepted as an important step in consolidating prior research [Kappelman, 1997; Seddon, 1999]. Their model is based on the work of Shannon and Weaver (1949) and on a study of 180 published empirical and theoretical papers which address the issue of IS success. In their construction of the model, DeLone and McLean(1992;2003) argue :"*…investigations determine the IS effectiveness frameworks for specific contexts…",* and also they state that: "*The structure of systems success is composed of a set of factors common to all systems plus a set of factors unique to each individual system*". Accordingly, in the third phase, considering the previous phases of the thesis in terms of paradigms, techniques and organizational characteristics, general IS research methodologies were discussed within the scope of quantitative versus qualitative approaches. Qualitative research was justified as an appropriate approach because of the characteristics of the Turkish Army. Relevant criteria were selected and while doing this, as DeLone and McLean (1992) argue: "*structure, size, mission and environment of organization"* were taken into consideration. Observation and semi-structured interviews were chosen as data collection methods. Since asking the right questions is the most important part of the interviews, in order to have valid and reliable question forms, selected criteria were assigned to questions from nine of the instruments which are accepted as the most valid and reliable instruments among researchers[Appendix A]. Replications were excluded, different scales and question forms were arranged according to qualitative research techniques. Then the questions were reworded as probing questions and translated into Turkish as interview form with 48 open-ended questions [Appendix B].

In the last phase of the study, a case study was carried out in the Turkish Military Academy. After the observation phase, IS literature concerning with IS/IT practices were examined in order to conceptualize the condition of current IS in the Military Academy. Considering IS maturity, dependent and independent variables of the   evaluation were determined and interviews

were held with some of the system users who were chosen with the cooperation of IS department in the Military Academy. As the nature of the case study as a qualitative research, calls for an integrative approach, analysis and data collection activities were performed concurrently throughout the study. It should be noted that the case study was not carried out just to test the interview form, but also for developing a methodology.

At the end of the study, after an analysis of collected data in a qualitative approach by constant comparative method,   seven propositions for key determinants of IS success and IS effectiveness assessment methodology were proposed.

1.4   Thesis Outline

The remainder of the thesis is organized as follows:

Chapter 2 presents an extensive survey and classification of prior research, subdivided by relevant literature topics. In the first section, reasons of assessment in the general sense are outlined, in the second section measurement problems are given, in the third section evaluation perceptions, paradigms and techniques are discussed and in the last section factors that influence IS effectiveness are reviewed. Therefore, this chapter provides a theoretical background for the research.

In Chapter 3, Organizational characteristics of the Turkish Army and national dimensions within the scope of IS evaluation and possible effects on assessment techniques are discussed.

Chapter 4 contains the selection of criteria, categorization of widely used instruments, the development of interview questions and a theoretical justification for qualitative approach in information systems research.

Chapter 5 describes a case study in a military organization. It includes a brief justification for the case study approach. Description of interview results and observation method are given in detail. At the end of this chapter, propositions for an IS evaluation methodology for the Turkish Army are asserted.

Chapter 6 is a summary and conclusion of the research. The thesis is summarized with emphasis upon the results obtained and the contributions made by this thesis. The limitations of the conclusions are described and suggestions for future research are outlined.

CHAPTER 2

LITERATURE REVIEW

IS effectiveness is defined as the extent to which a given information system actually contributes to achieving organizational goals. An information system is only effective when it contributes to organizational effectiveness [Yuthas and Eining, 1995; Thong et.al, 1993]. Another definition is that, an information system is said to be effective if it produces the desired result for which it was developed and effectiveness has a more political(organizational) definition than a rationalist, objective one [Abreu and Conrath, 1993]. As the society moves from the industrial era to the information era, organizations shift from localization to globalization and information systems' objectives shift from right information at right time to performance improvement [Malik and Goyal, 2001]. Since the emphasis shifts from "doing things right" to "doing the right things", the first definition is accepted as the primary one for IS effectiveness. Therefore, today, assessment of the value added to organizations by IS assets and the effectiveness of information systems are increasingly becoming important issues for both practitioners and researchers [Srinivasan, 1985; Scott, 1995; Yuthas and Eining, 1995; Seddon 1999]. Rau (2004) goes further and states that: "*never has demonstrating the value of IT to an organization been as imperative as today*". Despite the need for evaluations, there is no consensus on a structured and wholly accepted success framework. Considering those, in this chapter, international literature related with IS effectiveness and its assessment are given in an extensive manner and their capabilities and

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limitations are discussed in a comparative approach. At the end of the chapter, factors that influence IS effectiveness are reviewed.

2.1 Why Do We Assess IS Effectiveness?

Answer to the question of "Why do we evaluate?" is the main determinant for a measurement effort. Purpose or aim of IS effectiveness assessment may vary and be expressed in numerous contexts:

- By measurement, individuals are lead to a higher acceptance and use. It is motivating to disseminate the audit or feedback phenomena to the organization to enhance effectiveness. Therefore, in larger organizations it will enable goal attainment and managerial control by the help of personal awareness or knowledge of the feedback about effectiveness (for clients, users, vendors and developers). One important characteristic is the individual's awareness or knowledge of the feedback. Another characteristic is the individual's perception of the validity of the feedback in terms of its accuracy and informational value. Higher awareness of feedback and higher perceptions of its validity lead to greater acceptance and use of feedback by the individuals [Slaughter, 1996; Davies, 1998].

- Summative evaluation is done after the development is completed. It provides information about the effectiveness of the product to those decision makers who are going to adopt it. Results of the evaluation may cause to adopt and assimilate a pilot project as well as to discard systems [Kumar, 1990].

- A validated measuring instrument provides a standardized evaluation mechanism that enables comparisons across departments, systems, users, organizations; such formal measurement helps to build a cumulative research tradition in order to clarify effectiveness variables

[DeLone and McLean, 1992]. Measurement will enable our knowledge to turn into satisfactory and structured kind [Vicky, 1995].

- The evaluation of systems assists in obtaining those properties, which should be emphasized, and others, which need to be corrected. Investigations regarding the structure of systems success will be of increasing importance in the future as organizations seek to maximize the benefits of new systems in an increasingly competitive world. Evaluations of information systems will play a critical role in determining the direction of organizations, because IS are now becoming one of the key components in an organizations mission [Drury and Farhoomand, 1998]. Once information systems are used to gain competitive advantage, their use may become obligatory for continued competitive viability so it is a must to assess the effectiveness periodically to keep up with the rivalries because initial IS success may turn into competitive failure if the power of competition is not retained [Vitale, 1986].

- Organizations are spending a lot of money on expensive technology and increasingly, IT departments are finding that they have to demonstrate their worth resulting in an increasing emphasis on metrics in order to support IT. Without a measurable demonstration of IS effectiveness, IS managers may find investments in this area to flow slower than required [Kanungo, 1999; Drury and Farhoomand, 1998].

- Assessment intends to ignite skepticism in practitioner's minds (in particular top-level managers) by making practitioners think in terms of effectiveness, because many of managers may be techno-phobic, shortsighted and complacent about the need to use IT. Many of their decisions are based on desired relationships between technologists and among rival user groups. A new IS is often primarily designed to

redirect information flow and redistribute power rather than to improve performance [Martinsons and Chong, 1999].

- Evaluation makes the computer based information systems concrete for managers and users so that they can recognize, if and how the existing information system is need to be modified or changeover [Kumar, 1990].

2.2 Measurement Dilemmas and Likely Barriers

Managers of organizations and IS specialists/managers have a growing interest in evaluations of information systems. Despite the perceived importance of and the need for post evaluation of information systems, practices are relatively minimal, the common perception seems to be that post implementation evaluation is seldom performed or is not being performed adequately. In practice, evaluation is impeded by several problems:

- While the costs are easily identifiable, it is the benefits, which are most difficult to assess [Mende et.al, 1994].

- The problem of measurement may be that studies at an aggregate level have not considered the intermediate level of impact of IS and rather tried to relate directly to output variables like sales or profit [Kanungo et.al, 1999].

- Most, if not all, the empirical evidence on information systems effectiveness and its associating factors is confined to data from developed countries. The findings of such research cannot necessarily be generalized to other environments where the social, economical, and cultural characteristics are fundamentally different. Such evidence

needs to be validated using cross-cultural research [Khalil and Elkordy, 1996].

• IS effectiveness is a multidimensional construct, and there is no single, overarching measure of IS success [DeLone and McLean, 1992] and the dimensions of the IS effectiveness construct are difficult to identify clearly, the scope of the construct is not made explicit [Scott, 1995].The multiplicity of assessment approaches points to the lack of agreement on a meaningful IS effectiveness assessment framework. IS evaluation and its impact on organization cannot be done in isolation, but needs an integrated approach that monitors the IS from various views. A major reason for the limited success of evaluation research is the lack of common perspective among IS researchers. Most studies are on small pieces of the IS puzzle, without considering larger issues. A composite of different overall measures is the only plausible means of defining the construct and of overcoming the disagreement about a single measure [Abreu and Conrath, 1993; Malik and Goyal, 2001].

• A number of indicators of information systems implementation success can be found in the literature and there is little agreement as to what they ought to be. One reason is that the concept of effectiveness is very value laden and subjective. Thus, groups involved in an implementation process may disagree about assessments of a system's effectiveness. For example, the word "performance" has different meaning for users, managers and IS staff. Users want information system to run when they need it and produce what they want. Managers aim at fulfilling business objectives at low costs, IS people see their mission in ensuring the smooth technical operation of the system [Abreu and Conrath, 1993; Mende et al, 1994]. In other words, organizations typically have many IS stakeholders with multiple and conflicting objectives of varying time horizons [Pitt, et al, 1995].

- A major problem surrounding the IS assessment literature has been the inability of researchers to isolate the factors constituting the basic structure of successful IS from those comprising their surface structure [Drury and Farhoomand, 1998].

- If non-financial benefits are considered, most techniques for evaluating them are based on a quantitative approach. They identify relevant factors like improved customer service or better quality of data, but fail to use hard measurement techniques. Instead, personal judgments are expressed in grades (e.g. 1=excellent, 5=unsatisfactory), such numbers may show tendencies but do not satisfy the need for objective information. Without a semantic agreement on the content of surveys by all stakeholders, results may be just rows and columns adorning sheets [Mende et.al, 1994].

- An evaluation of existing systems is often a post project audit. It is carried out by specialized auditors who collect various data and interview selected users and managers. Typically, the result is a report addressed to a senior manager or committee. It focuses on costs and on mistakes made in the past. Consequently, people interviewed are often unwilling to reveal the system's weaknesses for fear they might be held responsible for them [Mende et.al, 1994].

2.3 What Are The Evaluation Perspectives/Models?

Overall aim of an IS is to improve organizational effectiveness. On the other hand, difficulty in empirically assessing system effectiveness in this way, directly relating to organizational outputs, has led to researchers to adopt surrogate constructs that are more easily measurable [Raymond, 1990]. Researchers have often adopted various measures of IS success to examine the underlying validity of surrogates [Vicky, 1995].

Beside the surrogate constructs, models are also important, because models help to analyze the structure and content of an information system and its interaction with the environment [Abreu and Conrath, 1993]. As Kanungo et.al (1999) state, there are no clear-cut models to assess IS effectiveness, so, researchers should have a holistic and integrative view for a reasonable assessment framework. IS models have to be theoretically based and have to imply hypotheses, which can be empirically tested [Abreu and Conrath, 1993]. This integrative approach will enhance cumulative tradition of information systems discipline [DeLone and McLean, 1992] and this tradition will enhance theoretical base of IS to understand and manage properly [Whyte and Bytheway, 1996].

The mixed order of surrogates and models do not reflect the importance of one to another, i.e. last model is not superior to others, but my order is in rather chronological and cumulative sense.

2.3.1 Cost Benefit Analysis

Although there have been some techniques for cost-benefit analysis like decision analysis(cost comparisons of alternative systems), cost displacement/avoidance, cost effectiveness analysis, breakeven analysis, time savings times salary and the work value model; such analyses have become a weakness in information systems evaluations. Because costs are always immediate, certain and tangible; but benefits are frequently distant, uncertain, and intangible. In other words, available literature shows that there are no reliable methods of making a quantitative cost-benefit evaluation [Sasone 1988; Kanungo et.al 1998]. In addition to that as Sasone(1988) stated; cost-benefit analysis will be obsolete because information systems will not be seen as only financial investments but rather an indispensable part of core business. Sasone's anticipation is validated today and Rau (2004) notes that to be competitive, organizations and functions within

organizations, must demonstrate value to stakeholders. He adds that rather than cost analysis, measurement of information systems' value added to organization should be considered.

2.3.2 User Satisfaction

As Srinivasan (1985) states, while acknowledging the importance of economic analyses of IS value, researchers responded by shifting emphasis from efficiency to user effectiveness by focusing either on IS usage or perceived effectiveness. Like Srinivasan, Melone (1990) notes that while measuring effectiveness, difficulty of implementing economics based construct accelerated the researchers to search for identifiable and easily measurable variables like user satisfaction.

On the other hand, Kanungo et.al (1999) state that proliferation of tools to measure user information satisfaction has not resulted in a well-accepted evaluation methodology, because some of the more sophisticated user satisfaction measurements were based on complex metrics and complex measures have not necessarily been shown to be more accurate. In addition to that, Melone (1990) claims that there are some theoretical and practical issues related to user satisfaction remain to be solved. Also, Melone (1990) notes that user satisfaction is not appropriate surrogate in the measurement of IS effectiveness and in her article she declares the reasons why user satisfaction cannot be a surrogate for effectiveness. She declares that there may be some inconsistencies as:

Ineffective IS → satisfied users
Effective IS → unsatisfied users

First reason of this inconsistency is that assessment frameworks do not consider the subjectivity of the people in organizations. This subjectivity may

be because of organization type as well as various viewpoints of the users. Assessment instruments should consider various viewpoints. Some users may emphasize the achievement of support goals. Support goals may be important for IS staff but the achievement of output goals is likely to be of greater interest to executive management and those outside the IS group. Some users may emphasize current goals, but some users may emphasize strategic goals. So, without a semantic agreement on viewpoints and system type, assessment will not be consistent with actual condition of IS effectiveness.

Melone argues that another reason of inconsistency is the unconsidered relations between attitude and behavior. She states that an attitude is an evaluative response to a stimulus or an object and attitude formation should be considered in assessments. Because in an assessment, users' evaluative responses to information technology is attempted to be comprehended by researchers. Not to make mistakes and to be able to use user satisfaction as a surrogate of IS effectiveness; researchers should take a more theoretical view about attitudes. Melone argues that users' attitudes may be influenced by:

- The interpretations and attributions related to the reasons for an action (e.g., attributions of why management installed a productivity tracking system),

- A person's reconstruction of past events(e.g., events related to the implementation of an information system),

- The judgment of social stimuli surrounding the technology(e.g., an individual with a positive view toward the organization tends to view the organization's goals as similar to his own),

- Expectations and influences related to the technology (e.g., if the technology is considered to be good, it is more likely to be seen as having good effects, such as improving the productivity, rather than having bad effects, such as eliminating jobs),

- Predictions of future events (e.g., if people want a system to succeed, they tend to think it will).

Consequently, trying to get responses from users just by a questionnaire causes researcher to acquire wrong results because these responses involve attitudes and attitudes of users could be caught only by intensive research and observation.

Srinivasan, in his research (1985) concludes that user satisfaction (he calls it "user perceived effectiveness") and system usage are not always positively associated with each other. On the other hand, DeLone and McLean (2003) alleges that use and user satisfaction are still good surrogates for IS effectiveness assessment.

2.3.3 System Usage

System usage has been recommended and widely used as a measure of system effectiveness in IS research, particularly when the use of system mode is optional [Melone, 1990]. System usage can be measured by monitoring the use in terms of log in times, length of log in time, number of systems utilized, or number of records accessed and updated [Khalil and Elkordy, 1996]. On the other hand, Srinivasan(1985) argues that while in some classes of systems strong positive associations may exist between system use and system effectiveness, in some other classes of systems these two may indicate two entirely different phenomena because not all of

the information systems are used voluntarily and this may cause researcher get erroneous results about system's effectiveness.

2.3.4 Decision Performance

Decision performance is arguably the most direct and relevant measure of IS effectiveness [Melone, 1990]. Decision performance is the degree to which the system supports or improves decision-making [Yuthas and Eining, 1995]. It is the effect of the system on the performance outcomes for an individual decision maker. Decision performance generally includes a productivity dimension that focuses on the efficiency with which tasks are accomplished and a quality dimension that focuses on the efficacy of the decision. Yuthas claims that since it is difficult to measure decision performance, system usage and user satisfaction are often used as substitute measures for decision performance in research and practice. However, at the end of his research, he concludes that user satisfaction and system usage are not appropriate for decision performance in the measurement of IS effectiveness. This claim of Yuthas may be related to statements of Melone about the problematic area of user satisfaction surrogate. In other words, user satisfaction and system usage may not be a good surrogate for decision performance and IS effectiveness if perceptions of the users are not validated by attitudes and if viewpoints are not classified consciously.

2.3.5 DeLone and McLean Model (1992)

DeLone and McLean(1992) claim that if the effectiveness of an information system is attempted to be measured by various independent variables such as user involvement or the level of IS investment, this evaluation research do not make a contribution to the world of practice. They emphasize that different researchers have addressed different aspects of success, making comparisons difficult and the prospect of building a cumulative tradition for IS

research similarly elusive. They proclaim that in searching for an IS success measure, rather than finding none, there are nearly as many measures as studies.

DeLone and McLean state that a comprehensive model is needed to assess effectiveness of information systems. They affirm that they reviewed 180 articles on IS effectiveness and organized them according to dimensions of their taxonomy.

They construct their model on Shannon and Weaver's communication theory. The reason they build their model on information theory is that, information flows through a series of stages from its production through its use and information can be measured at different levels with different criteria and information is in very different forms at different levels.   In other words, there may need to have separate success measures for each of the levels of information and success model should combine all of the levels of information.

According to Shannon&Weaver's Communication Theory, information has three levels as:

Technical level   : Accuracy and the efficiency of the system, which produces information
Semantic level   : The success of the information in conveying the intended meaning
Effectiveness level: Effect of the information on the receiver

They depict their information systems success taxonomy with communication theory as in the figure 1.

Shannon and Weaver (1949)	Technical Level	Semantic Level	Effectiveness or Influence Level		
Categories of IS Success Delone&Mclean (1992)	System Quality	Information Quality	Use — User Satisfaction	Individual Impact	Organizational Impact
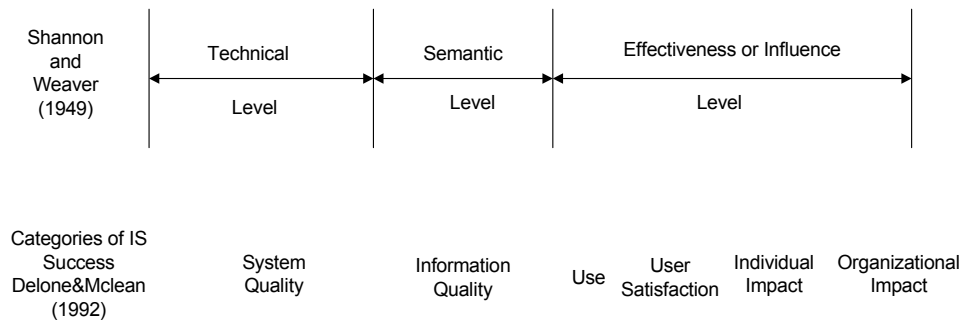
Figure 1 DeLone and McLean's Taxonomy of IS Success Categories with Shannon and Weaver's Communication Theory

Their taxonomy brought a general agreement on categories of success among researchers [Drury and Farhoomand, 1998; Seddon et.al 1999].

For every category/dimension, DeLone and McLean classify assessment measures:

- System quality: Measures of the information processing system itself.
  - ➢ System quality measures: 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, respond time, turnaround time.

- Information quality: Measures of system output, namely, the quality of the information that system produces, primarily in the form of reports
  - ➢ Information quality measures: 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.

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- Information use: Recipient consumption of the output of an information system

  ➢ Information use measures: 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 from system use, regularity of use, use by whom?, direct vs. chauffeured use, binary use: use vs. no use, 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 use, report acceptance, percentage used vs. opportunity for use, voluntariness of use, motivation to use.

- User satisfaction: Recipient response to the use of the output of an information system

  ➢ User satisfaction measures: Satisfaction with specifics, overall satisfaction, single item measure, multi-item measure, information satisfaction: difference between information needed and received, enjoyment, software satisfaction, decision-making satisfaction.

- Individual impact measures: The effect of information on the behavior of the recipient

  ➢ Individual impact measures: Information understanding, learning, accurate interpretation, information awareness, information recall, problem identification, decision effectiveness: decision quality, improved decision analysis, correction of decision, time to make decision, confidence in decision, decision making participation, improved individual productivity, change in decision, task performance, quality of plans, individual power, or influence, personal valuation of IS, willingness to pay for information.

- Organizational impact: The effect of information on organizational performance.

  ➢ Organizational impact measures: Application portfolio: range and scope of application, number of critical applications, operating cost reductions, staff reduction, overall productivity, gains, increased revenues, 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, service effectiveness.

Their model (figure 2) is:

- Complete: model incorporates and organizes all of the previous research in the field and involves all of the levels of information,

- Parsimonious and simple: model does not get caught up in the complexity of the real world,

- Predictive: model is not so firmly structured in order to capture the unstructured variables in a highly volatile ecology of organizations.
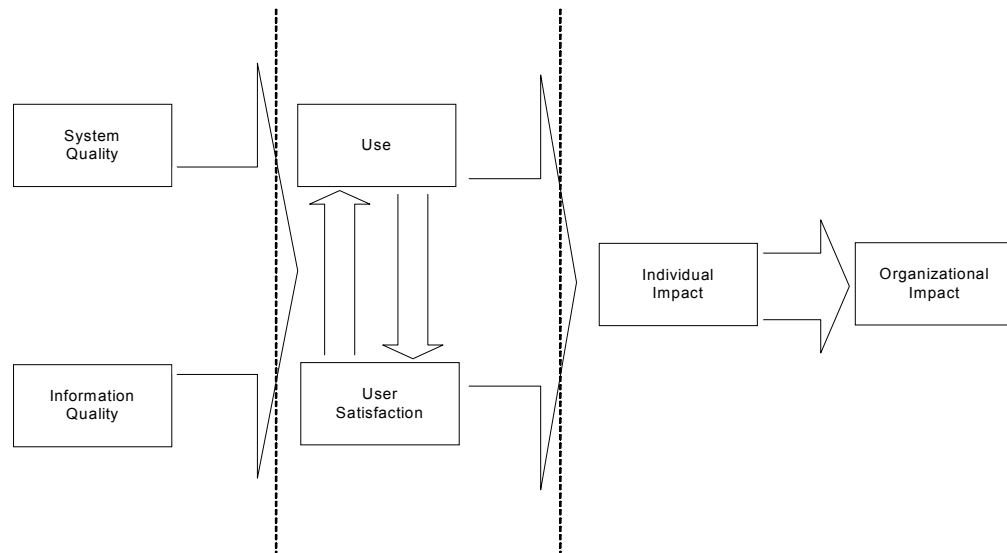
Figure 2 DeLone and McLean IS Success Model

DeLone and McLean advise to researchers:

- Researchers should combine the measures from six categories systematically in order to create a comprehensive measurement instrument.

- Researchers 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.

- Researchers should take into account that the success model is an attempt to reflect the interdependent, process nature of IS success and dimensions are not independent but rather interdependent so researchers also investigate their target information systems dimensions' interdependencies.

- The success model needs further development and validation before it could serve as a basis for the selection of appropriate IS measures.

They conclude that they provide a more comprehensive view of IS success than previous researches by organizing a rich but confusing body of research into a more understandable and coherent whole. So, they believe that they built a cumulative tradition in IS and they accept much work is still needed particularly in assessing the impact of information systems on organizational performance.

2.3.6 Service Quality (SERVQUAL)

Commonly used measures of IS effectiveness focus on the products rather than services [Pitt et.al, 1995]. IS departments provide range of services to their users. They have expanded their roles from product developers to service providers. This may be the main function of IS departments. The quality of the IS department's service, as perceived by its users, is a key indicator of IS success. Service quality should be included in the researcher's measures of IS effectiveness.

According to Pitt et.al, service quality can be assessed by measuring user's expectations and perceptions of performance levels for a range of service attributes. The difference between expectations and perceptions of actual performance can be calculated and averaged across attributes. There are five dimensions of service quality:

- Tangibles: Physical facilities, equipment, and appearance of personnel

- Reliability: Ability to perform the promised service dependably and accurately

- Responsiveness: Willingness to help customers and provide prompt service

- Assurance: Knowledge and courtesy of employees and their ability to inspire trust and confidence

- Empathy: Caring, individualized attention the service provider gives its customers.

Like Pitt. et.al, Whyte and Bytheway(1996) argue that the effective management of these service attributes will lead to users to perceive the service operation as being of superior quality.

The forces influencing users' expectations are shown in figure 3. The difference between expected service and IS' perceived service is depicted as a gap- the discrepancy- between what users expect and what they think they are getting.

USER

Word-of-mouth communications | Personal Needs | Past Experiences

VENDORS

Vendor Communications → Expected Service ← IS communications

Gap

Perceived Service
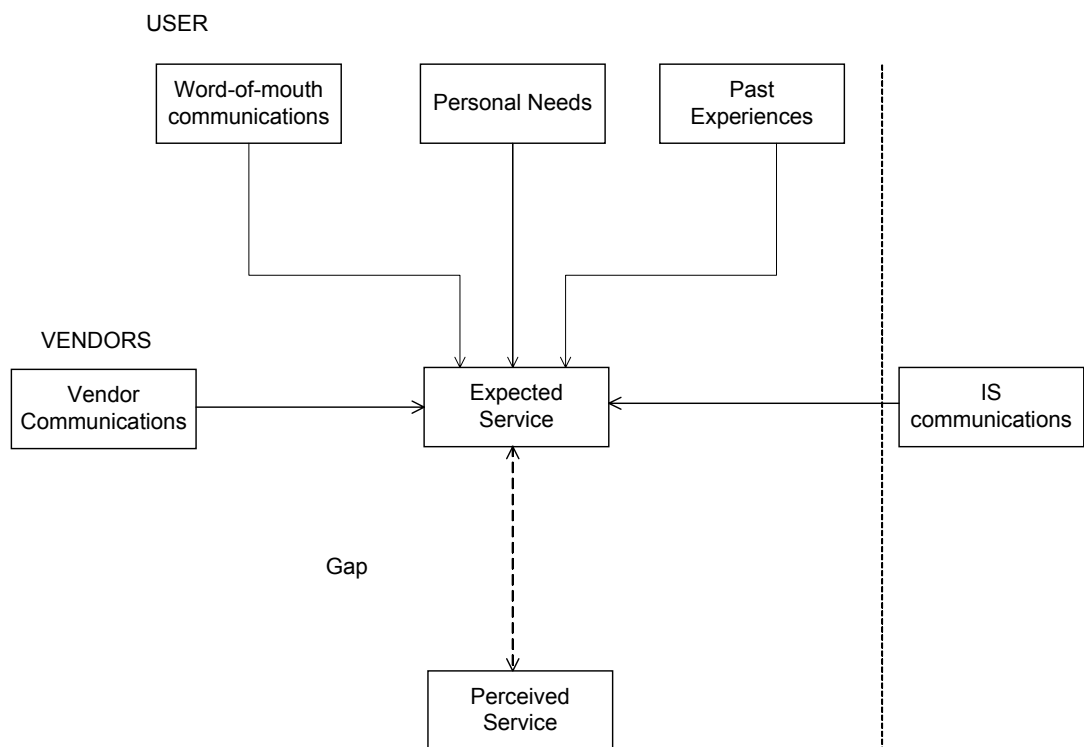
Figure 3 Determinants of User Expectations and Pitt's Gap Model

Expectations of users are formed by:

- Word-of-mouth communications: Users talk to each other and exchange stories about their relationships with the IS department. These conversations may fashion users' expectations of IS service.

- Personal needs: Users' personal needs influence their expectation of IS service.

- Past experiences: Prior experiences are the basics of expectations.

- IS communications: IS department can be a very powerful shaper of expectations during development phase. IS department itself may create unrealistic expectations.

- Vendor communications: Vendors trying to sell products, often raise expectations by parading positive features.

For the user, the goal is not the delivery of the system, but rather information it can provide. Clearly, providing information is a fundamental service of an IS department and it should be concerned with the quality of service it delivers. Authors asserts that the effectiveness of an IS can be partially assessed by its capability to provide quality service to its users. Pitt et.al go further and propose and extension to categorization of IS success model of DeLone and McLean (1992).

In Pitt's article, there are two surveys each with 22 items to research service quality expectations and perceptions. Followings are the survey items used in SERVQUAL perception determination. The same items are used for expectations.

P1. IS has up-to-date hardware and software

P2. IS's physical facilities are visually appealing

P3. IS's employees are well dressed and neat in appearance

P4. The appearance of physical facilities of IS is keeping with the kind of services provided

P5. When IS promises to do something by a certain time, it does so

P6. When users have a problem, IS shows a sincere interest in solving it

P7. IS is dependable

P8. IS provides its service at the times it promises to do so

P9. IS insists on error free records

P10. IS tells users exactly when services will be performed

P11. IS employees give prompt service to users

P12. IS employees are always willing to help users

P13. IS employees are never be too busy to respond the users' requests

P14. The behavior of IS employees instills confidence in users

P15. Users will feel safe in their transactions with IS employees

P16. IS employees are consistently courteous with users

P17. IS employees have the knowledge to do their job well

P18. IS gives users individual attention

P19. IS has operating hours convenient to all its users

P20. IS has employees who give users personal attention

P21. IS has the users' best interests at heart

P22. Employees of IS understand the specific needs of users

Rating: For each statement, attendee rate according to a scale like this:

(Poor) 1-----2-----3-----4-----5-----6-----7 (Excellent)

Pitt et. al assert a formula for assessment of their 2x22 questions:

Service quality is captured by a difference score (G):

G=P-E (P and E are the average ratings of a dimension's corresponding perception and expectation statements respectively.)

- **Criticisms on Servqual:**

Although SERVQUAL based instruments have become increasingly popular with the IS researchers to assess effectiveness, a review of literature suggests that the use of such instruments may cause a number of measurement problems [Kappelman, 1997]. Kappelman (1997) claims that SERVQUAL (perception of users about the IS minus Expectations of users) calculations, tend to exhibit reduced reliability, poor discriminate validity, spurious correlations and restricted variance problems. Moreover, inconsistent definitions and interpretations of the "expectation" construct lead to a number of problems. Kappelman(1997) notes that the use of perception-minus-expectation difference scores is problematic. They state that their critique should not be interpreted as a claim that expectations are not important or expectations should not be measured, on the contrary they accept the evidence that "should" and "will" expectations are precursors to expectations, but only perceptions influence the overall service quality. Kappelman proposes to an alternative for "SERVQUAL expectations-minus-perceptions instrument" as the use of "perceptions-only method" scoring. They claim that "perception–only" scores are superior to the perception-minus-expectations difference scores in terms of reliability, convergent validity, and predictive validity. In addition, they argue that the use of perception-only scores reduces by %50 the number of items that must be answered (Pitt et.al in his SERVQUAL article proposes 22 questions for expectations and 22 questions for perceptions and Kappelman asserts that 44 questions will decrease to 22). As a second alternative, Kappelman states that combining items into a single term involving both value of perceptions and expectations; this would maintain and increase the theoretical value of measurement. Kappelman concludes that service quality concept is very important in IS theory and practice but the development of improved measures of service quality for an information systems services deserves further theoretical and empirical research.

Although there may be debates about the instruments of SERVQUAL assessment, it is a fact that service quality has become increasingly popular among IS researchers [Kappelman, 1997]. For instance, DeLone and McLean augmented their former (1992) model by adding a "Service Quality" dimension in 2003 model of D&M success model.

2.3.7 Drury And Farhoomand's Success Model (1998)

Drury and Farhoomand (1998) argue that D&M success model is a generic framework and although they accept that the structure of IS success is composed of a set of factors common to all systems; there are also a set of factors unique to each individual system (generic vs. specific properties). Drury and Farhoomand also declare that assumption of information systems as a standalone system limits the intra-corporate systems dimensions. Because of the technological, economic and organizational changes, growing numbers of organizations need to coordinate their inter-organizational relations through telecommunication links. (Internal vs. external properties).

Their proposed model (Hierarchical Structural Model) is based on both generic structure of D&M success model and Swanson's (1994) IS Success classification. In Swanson's classification, success structure is classified into three types. Type I is a process system restricted to the functional core. Type II applies IS products and services to the administrative core of the host business organization. Type III is inter-organizational system properties that integrate IS products. Swanson's (1994) IS success classification model is as depicted in figure 4.
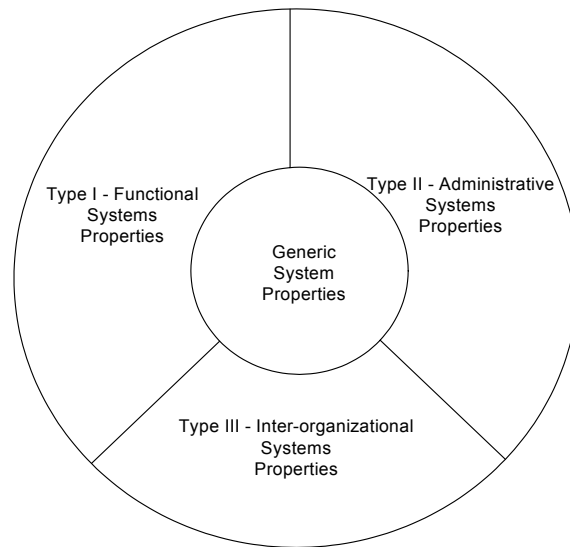
Figure 4 Swanson's IS Success Classification

After setting the fundamentals, Drury and Farhoomand construct their model
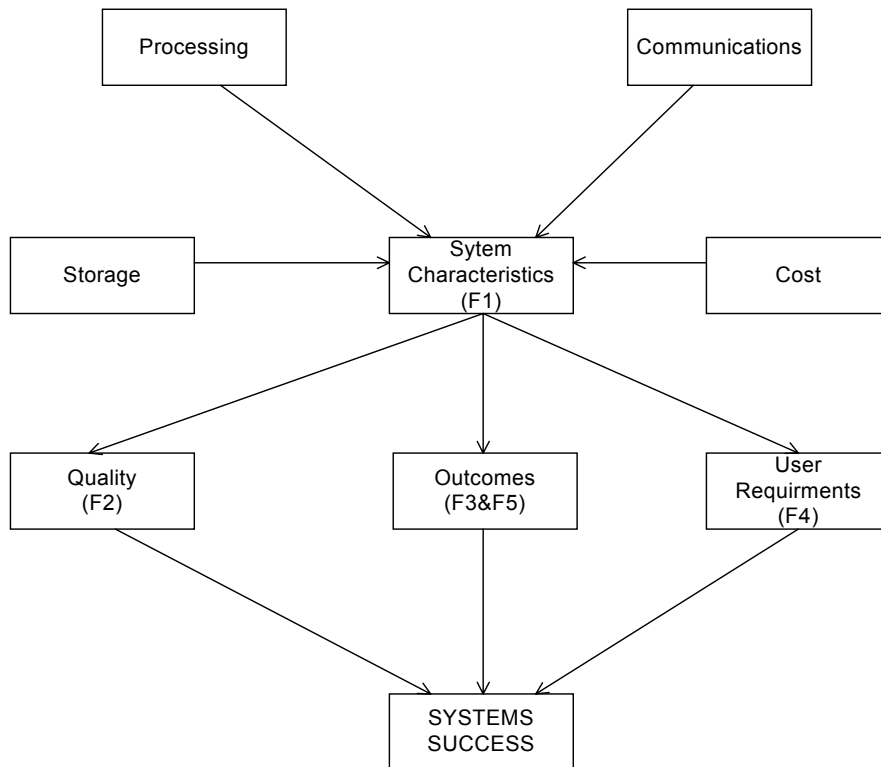
Figure 5 Drury and Farhoomand's Hieararchical Structural Model

The constituents of this model are summarized below:

- F1. System characteristics

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- ➢ Overall-cost effectiveness of the system
- ➢ Ease of use of the system
- ➢ Adequacy of system's storage capacity
- ➢ Adequacy of system processing speed
- ➢ Accessibility of the system

- • F2. Output Quality
  - ➢ Accuracy of output information
  - ➢ Relevance of report contents to intended function
  - ➢ Completeness of output information
  - ➢ Precision of output information
  - ➢ Reliability of output information
  - ➢ Timeliness of report delivery to users

- • F3. System's Outcomes
  - ➢ Decrease in inventory, personnel, or transaction costs
  - ➢ Reduction in paper work
  - ➢ Improvement in capturing and controlling data

- • F4. User Requirements
  - ➢ Overall support provided to users by IS staff
  - ➢ Users' understanding of the system
  - ➢ Users' participation in the development and implementation
  - ➢ Training provided to the users
  - ➢ Top management involvement in defining MIS policies.

- • F5. Inter-corporate Outcomes
  - ➢ Improvement of your company's image in Industry
  - ➢ Improvement in Customer services
  - ➢ Increase in inter-corporate transactions
  - ➢ Enhancement of inter-corporate coordinative efforts

> ➢ Increase in sales

In this model, success of information systems is considered to be composed of two basic categories:

- Generic properties that are shared by all successful systems

- Those that are specific to a particular type or class of IS

Also IS is divided into two broad categories

- Internal: Internal operations, management, decision making

- External: Systems for improving the bargaining power or comparative efficiency of the firm.

Emphasis on two categories (generic vs. specific) and (internal vs. external) causes their work to be a well contribution to IS effectiveness measurement research I believe.

2.3.8 Martinsons and Chong's Success Model (1999)

Despite the remarkable advances in information technology, many computer based information systems still fall short of performance expectations and a growing share of those implementation failures are due to non-technical issues[Martinson and Chong, 1999]. Authors note that IT can help people to do a better job, but only if they are willing to use the technology and if they become effective users. Even a good technical system may be sabotaged if it is perceived to interfere with an established social network. They make a comparison between traditional and contemporary information technology management (Table 1).

Traditional	Contemporary
Techno structure driven	User driven
Technical orientation	Business Orientation
IT is considered to be a cost	IT is considered to be an investment
Manage The Supply of IT	Manage The Demand For IT
Efficiency	Effectiveness
Specialists produce and maintain IS	Specialists support the users of IS
Individual Computing	Group computing
Stable systems	Flexible and dynamic systems
Process Automation	Process redesign

Martinsons and Chong say that an effective IS consists of the right IT application to support/help the right people to perform the right process. Effective IS adoption typically requires both technological and organizational change and two often go hand in hand as depicted in figure 6.
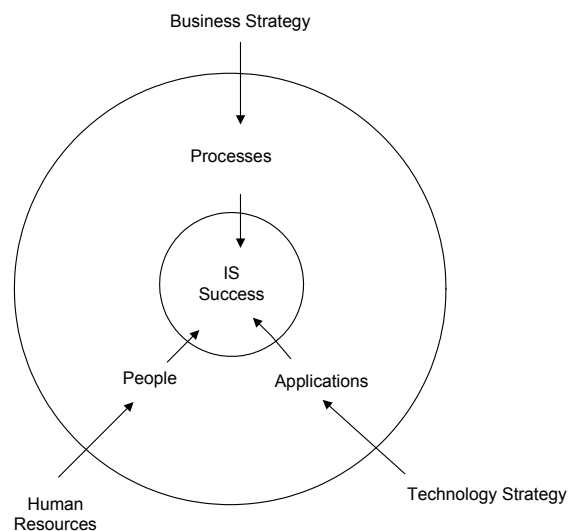
Figure 6 Aligning People, Process and the Technology

In my point of view, their comparison of traditional vs. contemporary IT management and alignment model should be considered through assessment efforts.

2.3.9 Seddon's Two Dimensional Matrix (1999)

Seddon states that there are a large number of IS effectiveness measures in the literature, but it is not clear what measures are appropriate in a particular context. He proposes a two-dimensional matrix, the first dimension is the type of the system studied and the second dimension is the stakeholder in whose interests the system being evaluated. Seddon says the matrix was tested by using it to classify IS effectiveness measures from 186 empirical papers in three major IS journals published in 1990-1999.

Seddon accepts that DeLone and McLean model of success is an important contribution to the literature on IS success measurement because that study was the first one that tried to impose some order and compose previous works, however, he claims that DeLone and McLean model does not explicitly recognize different stakeholders and IS subunits. In other words, Seddon argues that different stakeholders in an organization may validly come to different conclusions about the success of the same information system. He states that purpose of his work is to present an alternative to DeLone and McLean model.

DeLone and McLean model is built on Shanon and Weaver's communication theory; similar to this, Seddon's framework is based on seven questions of Cameron and Whetten (1983) who are organizational psychologists.

Seven questions to answer when measuring organizational performance:

- From whose perspective is effectiveness being judged?

- What is the domain of activity? (depends on tasks emphasized in the organization, competencies of the organization, and demands from external forces)

- What is the level of analysis?(individual, subunit, organization, population, societal)

- What is the purpose of evaluation?

- What time frame is employed?(short, long)

- What types of data are to be used? (objective or perceptual)

- Against which referent is effectiveness to be judged? (effectiveness of this organization compared to: some other organization; some ideal level of performance; stated goals of the organization; past performance of the organization; or certain desirable characteristics)

Seddon states that Cameron and Whetton's seven questions for measuring organizational effectiveness are relevant for assessment of IS effectiveness. Seddon defines stakeholder – first question- as a person or group in whose interest the evaluation of IS success is being performed. He classifies five points of view under five types:

- The independent observer who is not involved as a stakeholder

- The individual who wants to be better off

- The group, which also 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.

Seddon says he used the second question of Cameron and Whetton to define a second dimension as the system that is being evaluated. System dimension has six types:

- 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, a GDSS, a TPS, a data warehouse, etc.)

- All IT applications used by an organization or sub-organization

- An aspect of a system development methodology

- The IT function of an organization or sub-organization

Classifying IS effectiveness measures by these two dimensions result in 5*6=30 possible classes of measures.

To test the matrix, Seddon states that he follows the same methodology with the DeLone and McLean. Seddon reviews journals (management Information Systems Quarterly, Information Systems Research and the Journal of Management Information Systems)from 1988 to 1996, at the end, he classifies the 186 articles(these articles are the empirical studies of which dependent variable is IS effectiveness) according to his matrix.

Seddon argues that his paper's insights are:

- Units of analysis should be taken into consideration because vastly different systems need different measures of IS effectiveness (dimension of analysis unit/system)

- Different Stakeholders' views should be combined in a study to assess the effectiveness (dimension of stakeholder)

- In addition to two-dimensional IS effectiveness matrix, Cameron and Whetten's seven questions should be used for framing IS effectiveness measurement.

- Although Seddon argues that his classification is an alternative to DeLone and McLean's model, DeLone and McLean (2003) accept the validity of his matrix but they assert that this matrix should be used as a complementary rather than an alternative to their model.

2.3.10 DeLone and McLean Model Update (2003)

DeLone and McLean, in their 2003 article, discuss a ten-year contribution to the IS success research efforts focusing on their 1992 model. DeLone and McLean emphasize that their paper's (1992) primary purpose was to synthesize previous research involving IS success into a more coherent body of knowledge. They say that their success model has exceeded their expectations and nearly 300 articles in refereed journals referred to, made use of their IS success model and many of these articles positioned the measurement of the development of dependent variable(s) within the context of D&M IS success framework. They claim that the wide popularity of the model is strong evidence of the need for a comprehensive framework in order to integrate IS research findings.

Criticisms & Reflections:

- According to Seddon (1999), variance and causal model cannot be combined meaningfully in one model. DeLone and McLean (2003) accept Seddon's argument but note that process model has three components; creation of the system, use of the system and the consequences of this system use. Nevertheless, these steps are not sufficient, because in order to fully comprehend the dimensions a variance (causal) model is needed. Unlike a process model, which merely states that B follows A, a causal model asserts that A causes B; that is increasing A will cause B to increase (decrease). For example, higher system quality is expected to lead to a higher user satisfaction and use, leading to positive impacts on individual productivity, resulting in organizational improvement. DeLone and McLean note that interrelationships between dimensions are validated through 16 papers published by researchers studying on those relationships.

- Seddon's second argument is that "system use" must be removed from model, because he claims that "use" does not cause impacts. Seddon argues that system may be mandatory to use and much use does not mean much impact. Although DeLone and McLean accept his assertions about "use " and state that simply measuring amount of usage time does not properly capture the relationship between usage and the realization of expected results. On the other hand, they claim that declining usage may be an important indication that the anticipated benefits are not being realized. They also reject Seddon's argument about mandatory systems. They argue that no system is totally mandatory; at a level of the organization, an executive or management committee may choose and implement system and requires employees to use it. Thus, the system may be mandatory at one level but the continued adoption and use of the system itself may be wholly voluntary

So, management has always option of discontinuing a system that is not providing desired results and benefits. They conclude that "use" will continue to be an important indication of IS success for many systems.

• Another argument by Seddon is that D&M success model cannot be applied in all kinds of research contexts like different level of systems and different stakeholders. DeLone and McLean agree with Seddon and acknowledge Seddon's 'two dimensional matrix" as a complementary to their model. Also they remind that they noted in their paper(1992): "*This success model clearly needs further development and validation before it could serve as a basis for the selection of appropriate IS measures* "

Model Update and Extensions:

DeLone and McLean 1992 model's dimensions were: System quality, information quality, use, user satisfaction, individual impact, organizational impact. They extended and updated their model (Figure 7) as follows:

• In 2003, they add a "service quality" dimension. They state that IS has a role of service provider and it is a must to add "service quality" category to model. They refer to Pitt et.al (1995) and explicitly declare the agreement with them in terms of "SERVQUAL".

• DeLone and McLean combine "individual" and "organizational impact" categories into one as "net benefits". They note that IS impacts have evolved beyond the immediate user in general sense and all impact should be grouped into a single category for the sake of parsimony. They state that "net benefits"" variable dimension raises three issues that must be taken into account: What qualifies as a "benefit"? For whom? What level of analysis? They add that it is impossible to answer

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to these questions without first defining the context or frame of reference. They put forwards that this determination is matter of the researcher.
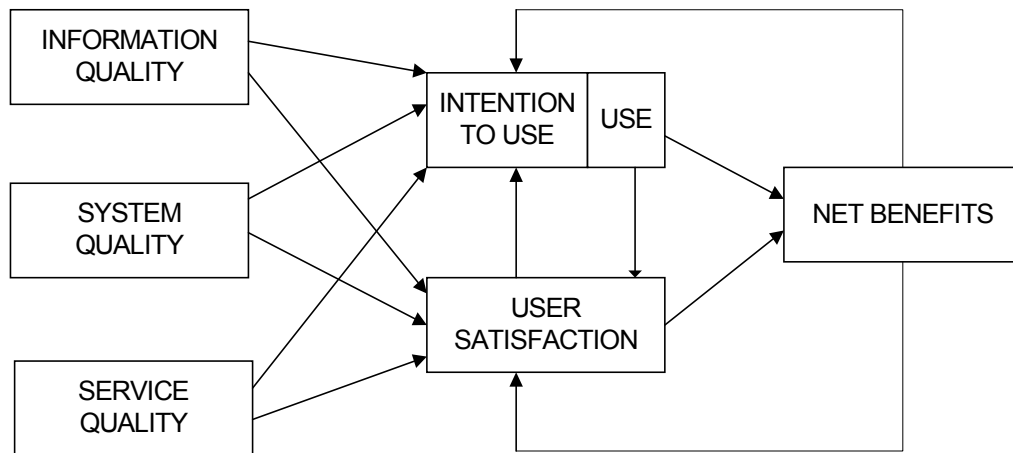
Figure 7 DeLone and McLean IS Success Model Update

- They decompose the "use" dimension into "use" and "intention to use" in the same category. They state that "user satisfaction" causes "intention to use" and so user uses the system and this causes "user satisfaction" and this interrelationship can only be demonstrated by decomposition of "use" dimension.

- They position the feedback channel from "net benefits" to backwards. I think this channel emphasizes the need for dynamic systems in a highly volatile business and technology environment.

They conclude that:

- The model should be tested and challenged,

- Variables of each dimension and interactions between dimensions should be established in specific frameworks,

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- "Net benefits" should be investigated and these investigations determine the organization specific nature of success framework in specific contexts.

2.4 Factors That Influence IS Effectiveness

Organizations develop and implement an IS to address specific organizational needs. With the growing use of new methodologies, development of IS has become a bidirectional and iterative process; but the IS adoption is more difficult than design and implementation [Martinson and Chong, 1999]. Although many IS studies try to identify those "factors" related to IS implementation and adoption success, there is little understanding of the actual process that brings in effective IS and there is no structured framework to map and understand the causal relationships between the factors of IS effectiveness that assist to capture the essence of IS use in organizations [Abreu and Conrath, 1993]. On the other hand, it is asserted by some researchers that, there are some issues that may affect the likelihood of effectiveness; in my point of view, these factors may be prospective rather than being prescriptive and there is not any strict border between factors.

2.4.1 Organizational Adaptation

Change management is important, starting at the project phase and continuing throughout the entire life cycle [Nah et al., 2001]. Organizational change should be managed [Falkowski et al., 1998], which include people, organization and culture change during IS adoption [Rosario, 2000]. Organizations should have a strong corporate identity that is open to change [Nah et al., 2001]. An emphasis on quality, a strong computing ability and a strong willingness to accept new technology would aid in implementation efforts. Management should also have a strong commitment to use the system for achieving business aims [Roberts and Barrar, 1992]. Users must be trained and concerns must be addressed through regular communication,

working with change agents, leveraging corporate culture and identifying job aids for different users [Rosario, 2000]. Martinson and Chong(1999) assert that it is not enough for a new IS to meet technical specifications and domain needs, the potential benefits of IS can not be fully realized if existing work flows are merely automated. Instead, it is necessary to fundamentally rethink the business and redesign its tasks and processes based on desired outcomes and technological capabilities. Chang and King (2000) suggest that "organizational commitment" is necessary for success and they describe it as a level of organizational support for the IS function and they conclude that better support would be expected to lead a better performance. Changing or adapting the rules and the regulations may be an imperative step for successful adaptation especially in public organizations.

2.4.2 Psychological Climate

Every organization develops its own psychological climate with respect to IS and this climate is set by the dominant view of IS held by the members of the organization in terms of expectations, preconceptions and attitudes prevalent in the organization [Dor and Segev, 1978]. Even a good technical system may be sabotaged if it is perceived to interfere with an established social network and it is very difficult to overcome resistance to unwanted change simply through training or forced inducements; instead, it is necessary to first establish the cultural and structural conditions that will be conducive to change [Martinson and Chong, 1999].

Dor and Segev (1978) note that excessive expectations can be fostered by experts leading managers to expect much more of information systems than reality. On the other hand, obverse error is sometimes executed, this occurs when the experts are fearful of creating exaggerated expectations and this may decrease the possible benefits of information systems. Dor and Segev add that low expectations may be because of bad experiences and also this

may decrease the probability of success but as reverse, good experience with a successful system generates favorable attitudes and encourages for further success.

Abreu and Conrath (1993) assume that the expectations before system implementation correlate significantly with post-implementation attitudes and the actual use of the system. Therefore, users who held realistic expectations prior to installation are more satisfied than users with unrealistic expectations. Abreu and Conrath suggest that user expectations are essential variables affecting perceived IS effectiveness. In the same way Martinson and Chong (1999) argue that, win-win situations or perceptions should be realized between all parties for an effective information system in an organization.

2.4.3 Human Resources Issues

Inadequate consideration and poor management of human factors can hinder the use and effectiveness of IS [Martinson and Chong; 1999]. The characteristics of individual users and their work environment can influence IS performance. Pitt et.al (1995) avow that IS users do not just want a machine; rather they seek a system that satisfies their personal computing needs. A single hardware, software, and procedure is almost unlikely to suit everyone; technical specialists support users, however, good technical support does not ensure that an IS will be effectively used. Martinson and Chong(1999) mention some problems and proposals for Human related issues:

- System analysts and designers tend to focus on the virtues of IT and underestimate the importance of creating an easy-to-use application, which will work with people rather than against them. Technological change may spark employee fears about job insecurity, loss of work control and deskilling. There may be some IT-phobic individuals, who

are typically senior-level employees with many years of experience in organizations may feel embarrassed because they do not understand the technology and do not know how to use it effectively. It is very difficult to overcome resistance to unwanted change and fear simply through training or forced instruments. Instead, it is necessary to first establish cultural and structural conditions that will be conducive to change. Human resources specialists can help to remove the threatening nature of IS and shape the expectations for the associated change.

- Once a favorable environment has been created, training can help to facilitate the change process. Type A learning involves the relatively straightforward matter of "what buttons to push". However, this should be augmented by efforts to explain the relationship between the new IS and business objectives. B type of learning is best done in tandem with ongoing usage; thus, use of new IT application and exploration of other applications may be encouraged.

- Human resources specialists can develop programs or take some precautions for users to enable them being comfortable and effective with the technology. These should involve ergonomic as well as health and safety issues. The main significant health problems are the eyestrain and muscle aches associated with visual display units and keyboards respectively.

2.4.4 Organizational Maturity

Dor and Segev (1978) define mature organizations as the degree to which organizational processes are systematized and formalized through rules, procedures and management practices. They state that maturity requires the organizational resources to be well understood. They also note that, old and established organizations, which are run informally and intuitively, may be

very immature, whereas a new, rationally structured and well-planned organization may be very mature in spite of its youth. In mature organizations processes are well understood, described in quantitative terms rather than qualitative features and in these organizations, socio-political structures are expected to be rational. Raymond (1990) claims that more mature organizations are more likely to implement and use IS effectively.

2.4.5 Task Environment

Khalil and Elkordy (1996) argue that task environment characteristics may influence information systems effectiveness. Task environment includes all social and physical factors that directly influence decision-making process.

Khalil and Elkordy (1996) define unstructured decisions as new, ill defined and having no well defined procedure to handle them. Compared with the structured decisions, unstructured decisions call for the acquisition and processing of extensive information and the use of value judgment and intuition. One problem with unstructured decisions is the difficulty of planning the information needed to make them. Cheney and Dickson (1982) claim that if an information system is designed to support managerial decisions rather than merely processing data; such system is expected to decrease the degree of unstructuredness in the user's decisions. Consequently, that system increases the user satisfaction with it. On the other hand, Tushman (1978) found no relationship between task structuredness and the overall usage rate of information. Khalil and Elkordy (1996) conclude that they found no relationship between decision unstructuredness and information system use. Alternatively, they note that this association cannot be generalized in all kind of organizations and they advise to researchers to study on this issue.

Two important factors affecting decision-making process are complexity and dynamism. Khalil and Elkordy (1996) define complexity of task environment as the number and similarity of factors taken into consideration in decision-making, this complexity brings uncertainty to environment. They claim that information system use is expected to decrease the complexity by formalizing information needs and processing procedures.

Khalil and Elkordy (1996) define dynamism as the rate of task environment change and it determines whether the factors affecting the decision making over the time. They claim that increased dynamism in a task environment increases uncertainty that in turn increases the information processing needs, so managers and users are expected to use information systems and be satisfied with them to the extent that these systems provide with the necessary information to cope with the changing environment.

In other words, decision unstructuredness, complexity and dynamism of task environment initiate the need for an information system. Khalil and Elkordy conclude that complexity and dynamism of task environment have relationships with effectiveness via system use but these associations may not be straightforward and need further research.

2.4.6 Organizational Size

Dor and Segev (1978) claim that organizational size is a factor for IS effectiveness. They state organizational size is a factor because it affects degree of formalization and resources for information system. Like Dor and Segev, Raymond (1990) asserts that IS success is more likely in larger organizations than in smaller ones, because small organizations are generally inadequate in human resources and financial terms and less developed in terms of structure and functions. Raymond claims that small organizations are thought be more prone to IS failures because they do not

have sufficient managerial and technical expertise concerning the development, operation and usage of information systems. In other words, larger organizations with great human, technological and financial resources are likely to be more successful in the usage of information systems than smaller ones. On the other hand, by the help of growing technology and decreasing costs, smaller organizations also may have effective information systems if the problem is just financial [Rau, 2004].

2.4.7 Organizational Structure

Dor and Segev(1978) assert that the structure of an organization in terms of centralized or decentralized is a factor for IS effectiveness. They claim that because of the nature of the control problem in decentralized organizations, the development of the new information technologies has been of little help in managing them. Because of increasing complexity of the control and communication, the likelihood of success in operating IS is lower in decentralized organizations. On the other hand, Martinson and Chong (1999) argue that organizational decentralization and devolution trends have removed the many obstacles for human resource specialists during the IS adoption process to attain an effective information system. It should be noted that new style of enterprises are generally decentralized but they need to use information systems more effective than ever to gain competitiveness [Laudon&Laudon, 1998].

2.4.8 Organizational Resources

Dor and Segev(1978) claim that IS function has to compete with other functions in the organization for whatever resources are available. Information system function is not generally perceived to be in front of the organization's activities in the same way that other functions are. Dor and Segev note that, only after the need for information system becomes self-

evident and the organization becomes aware of its necessity, IS achieves a position of significance in the organization's list of properties. 26 years after from Dor and Segev's comments, Rau (2004) states that it is widely accepted now information systems are the most important function of an organization, however, as Khalil and Elkordy (1996) state; this perception cannot be generalized to every country and organization. In other words IS still has to compete with other functions in an organization. Raymond (1990) claims that "sufficient resource" is an additional success factor for IS. He argues that increased allocation of organizational resources may enhance the probability of effective information system implementation and usage.

2.4.9 Top Management Support

Top management support is one of the consistent factors critical to IS effectiveness, because top management is able to ensure sufficient allocation of resources and acts as a change agent to create a more conducive environment for information systems [Thong et. al, 1993]. Visible CEO/top level manager support encourages positive user's attitudes toward the use of IS and leads to a smoother conversion from the existing work procedures. It should be pointed out that the support for change is most effectively communicated by actions rather than merely words [Martinson and Chong, 1999].

2.4.10 IS Maturity

Mahmood and Becker(1985) state that information system maturity plays an important role in IS effectiveness. They refer to Nolan's [Nolan, 1973] Stage Model to explain maturity and claim that it is the best-known and widely accepted model for growth and management. They assume that as an IS move from stage I to stage VI, it becomes more mature. In other words, information systems displaying characteristics of later stages were

considered to be more mature than organizations showing characteristics of former stages.

Nolan's model [Nolan, 1973] includes six growth stages:

Stage I Initiation:

Control of the computer resources is presumed to be lax, planning is almost nonexistent, and only few applications are installed.

Stage II Contagion:

Organization encourages innovation and extensive applications by maintaining low control and high slack. Nevertheless, lack of planning brings in poorly designed systems.

Stage III Control:

The problems arising from bad design and rising costs create difficulties for users and management, and a basic shift in orientation from management of the computer to management of data resources occur. This stage is also characterized by initial confusing attempts to develop user accountability for the expenditure incurred.

Stage IV Integration:

Database and data communication technologies are applied to several key application areas. This stage is also characterized by the level of high quality services. The users demand increased support, and as a result cost continues to increase. Control and planning system proves to be ineffective because of the redundancy of data. Demands grow for better control and more efficiency.

Stage V Data administration:

Data administration is introduced in which control of computing resources is tight; however, low slack is maintained in the development of new systems.

Stage VI Maturity:

The application portfolio, whose structure now mirrors the organization and information flows in the company, is completed. High slack is still maintained over the development of systems and control of computing resources is still very tight. At this point maturity is achieved.

In their empirical research Mahmood and Becker(1985) attempt to find relation between user satisfaction variables and maturity, at the end of their research, they conclude that there is a weak relation. On the other hand they advise researchers to study these factors in other organizations and they accept that anyone may reach a different conclusion about the relation between IS effectiveness and IS maturity.

Kanungo et.al (1999) in their empirical research, claim that 'improving system integration' has the highest influence on information systems effectiveness. Their research involves 40 organizations from seven different sectors and they classify these organizations according to Nolan's stages of growth. After evaluation of organizations they declare that as the organization's IS move on to higher stages, effectiveness increases, also they point out that the rate of growth is sharper as organizations move beyond the stage IV. They note that, it is important organizations show sustainable efforts in developing IS efforts; therefore, organizations should persist with the requisite investments in IT in the initial stages, with adequate managerial controls, to build a platform to experience significant benefits of information systems in the long run.

2.4.11 IS Management Issues

In practice, decisions on information systems are performed at the highest level and top management involvement is needed in all stages of IS adoption but IS department should be autonomous and its managers should report the incidences to the president of the organization [Dor and Segev, 1978]. Dor and Segev claim that assignment of responsibility for an information system to an executive raises the maturity of information system. They note that, this assignment is necessary in order to liberate IS from constraints imposed by subordination to any function in the organization. Positioning IS function independent from other organizational functions and location in higher in the hierarchy would increase the likelihood of IS success [Raymond, 1990]. In my point of view, now CIO's (chief information officer) have the positions Dor and Segev implied in 1978. Nowadays, in some organizations, CIO's are responsible for integrating and performing IS function [Heckman, 2003].

Dor and Segev (1978) note that as organizations become aware of the importance of information systems, they tend to establish steering committees to guide the IS effort. The functions of such committees are to establish policy on information systems to identify valuable projects and to recommend resource allocations. Dor and Segev claim that organizations with the high level steering committees tend to be more successful with IS than those without steering committees.

CHAPTER 3

CHARACTERISTICS OF THE TURKISH ARMY IN PERSPECTIVE OF IS EFFECTIVENESS ASSESSMENT

In the previous chapter, definition of information systems effectiveness, purpose of evaluation, measurement perceptions and effectiveness factors were outlined within the context of international private business literature.

A common definition of information system effectiveness is related to its contribution to organizational effectiveness [Thong et.al, 1993; Yuthas and Eining, 1995; Malik and Goyal, 2001]. Following this definition IS researchers have tried to devise some techniques to assess organizational effectiveness. In other words, it may be investigated if an information system is effective or not by measuring the contribution of the information system to the organization. For private business, this is rather applicable, because it is not impossible to compare the indicators of a company before and after IS implementation, or it is likely to have benchmarks from other companies in the same sector, but for an army it rather needs intricate investigations to have reliable data to evaluate effectiveness. Because there is no market indicator, there is no other organization performing in the same sector and the Turkish army has some diverse and intangible goals.

The Turkish Army,

o is a public organization,

o is comprised of Turkish people,

o is an active army, operating with other countries' armies anywhere on the world.

Since the ultimate goal of this research is to propose an IS effectiveness assessment framework for the Turkish Army, IS effectiveness assessment perceptions and techniques, which are generally constructed on non-Turkish private business literature, are investigated within the context of the Turkish Army considering the characteristics outlined above.

3.1 Impact of Public Organizations' Characteristics on IS Effectiveness Assessment

Comparative studies of private and public organizations often consider those organizations with dissimilar tasks or business purposes. Profit making business firms commonly represent the private sector and non-profit service or government regulatory agencies commonly represent the public sector. In other words, public sector organizations have been represented mostly by not-for-profit government agencies that have either a social service or a regulatory orientation; the private ones are for profit and market oriented "business firms", "manufacturing concerns", or "private enterprises" [Lachman, 1985].

Determining system value, particularly the system's impact on organizational effectiveness is a very complex issue for public sector information systems [Newcomer and Caudle, 1991]. Many of the IS effectiveness measures appropriate for business are relevant to public organizations; but public organizations' information systems require some unique measures and shifts in emphasis [Bozeman and Bretschneider, 1986]. On the other hand, as pointed out by Henry (1987), the distinction between private and public

organizations is often drawn from ideological beliefs rather than empirical research.

These criticisms emphasize the need for objectivity of the research in a way that the researcher gets rid of biases. These biases generally impose the opinion that public organizations are generally managed irrationally, they are ineffective and inefficient. The source of those prejudices may be the debate between political disciplines but this epistemological debate is beyond the scope of this study. The borders of the discussion area are drawn by the IS measurement perceptions and techniques which are dealt with in the previous chapter. In this section, differences are classified under the categories of economic characteristics, personnel attitudes, and management issues.

3.1.1 Economic Characteristics of Public Organizations

The main difference between public and private organizations is the economic character of respective sectors and the goods and services they deliver. The primary characteristic of a public service is that usually its benefits cannot be priced in the market. In private firms, entrepreneurs and managers exert pressure for a combination of economic input to maximize productivity. Private organizations monitor costs (inputs) and the quality of the product (output) and their organizational performance is measured in terms of reduced costs and increased quality. However, public managers obtain resources in a different manner so that reduced cost does not necessarily imply improved organizational performance [Bozeman and Bretschneider, 1986].

The Turkish Army is a public organization and its benefits cannot be priced in the market. In addition to that, reduced cost may not mean improved performance for a public organization. Although it may be attempted to

quantify benefits for cost-benefit analysis of information systems like decision analysis, cost displacement/avoidance, cost effectiveness analysis, time savings time salary, and work value model; such analyses have become a weakness in information systems evaluations, because costs are always immediate, certain and tangible; but benefits are frequently distant, uncertain and intangible. Therefore, cost benefit analysis may be used in the Turkish Army only if the benefits are quantified realistically.

3.1.2 Personnel Attitudes in Public Organizations

Attitudes have been one of the areas in which researchers have been interested, comparing public and private organizations. Government employees are less likely to believe that they have job autonomy, an opportunity to develop their abilities or a fair reward system compared to people working for business firms [Gauch, 1993]. Public officials are often characterized as being less innovative and performing greater cautiousness and rigidity in their actions because the environment of public organizations is seen as bureaucratic with fixed procedures and more formalized operational procedures [Thong et.al, 2000].

User satisfaction, which is prone to users' attitudes, is still a good surrogate for IS effectiveness measurement [DeLone and McLean, 2003]. In this technique, people are in the center of the evaluation and it is implemented by questionnaire surveys. Satisfaction questionnaires generally seek to address whether the respondents perceive the information provided by the system useful or not [Yuthas and Eining, 1995]. User centered evaluations are perceptual and attitudinal in nature. Melone(1990) claims that subjectivity of people derived from organization type may cause researcher to acquire wrong results like effective IS leading to unsatisfied users or ineffective IS leading to satisfied users if only questionnaires are used to get responses from users. In addition to that, rational perception of organizational goals is also vital for user-centered evaluations because outcome of an information

system, which satisfies the user, may not coincide with the organizational aim [Davis, 1985].

Daloğlu(2002), in his empirical research for the Turkish Army, contrary to the general opinion about the public employees, states that "in the Turkish Army *professionals are satisfied with their jobs, they feel inner appreciation to their works*" and Gökşen(2001) indicates that "*everyone in the army has clear settlement for the army's goals*". These hypotheses need further investigation because the Turkish Army is a large organization and there is a great vertical differentiation in both hierarchical levels and employee types. Therefore, it may not be realistic to categorize people in the Turkish Army as "motivated" or "unmotivated", because different groups of people namely officers, staff officers, non-commissioned officers, specialists and privates are very different from each other because of their education, motivation and the attitudes toward the army. Therefore, observations and interviews may enhance the objectivity of an assessment instead of questionnaires which are prone to personal biases.

Kurt (2001) in his study investigating the use of IT in the Army, states that information technologies are mostly used in routine and programmable managerial tasks, they are rarely used in non-programmable managerial tasks and functions such as strategy development. It may be interpreted from his statement that the people in the Turkish Army may recognize information system as the low-level data processing systems. So this may affect the results of the questionnaires performed for IS assessments which need users' awareness of differences between 'information system' and 'information technology'. In other words, in the Turkish Army, personnel may tend to perceive IS effectiveness as 'level of technology'. For example answer to a questionnaire element like "are you satisfied with new IS?" may not reflect the satisfaction derived from the IS but the answer may be the expression of the enchantment of a new computer system. So, this may affect the results of IS evaluations which are generally constructed on the

basis of capturing the people's perceptions like user satisfaction, service quality or usefulness.

3.1.3 Management in Public Organizations

Public organizations operate under legal and formal constraints resulting in less autonomy for the managers. Public administrators have less decision-making autonomy and flexibility [Thong et. al, 2000], because the work environment of public manager in contrast to that of a manager in private organizations is seen as bureaucratic with fixed and more formalized procedures [Gauch, 1993]. In a private firm, authority rests on economic incentives. In public organizations, the grant of authority is formally embodied in a legal and constitutional structure [Bozeman and Bretschneider, 1986]. Because, public organizations have lower market exposure and different legal and formal constraints than private ones [Lachman, 1985].

System usage is widely accepted as a measure of system effectiveness for information systems [Khalil and Elkordy, 1996], on the other hand, as asserted in previous paragraph, the environment of a public organization is rather bureaucratic and officials in a public organization have to follow some fixed procedures. Therefore system usage may be mandatory and employees may not have autonomy in performing their jobs; so as Srinivasan (1985) argues, while in some classes of systems, strong positive associations may exist between system use and system effectiveness, in some other classes of systems these two may indicate two entirely different phenomena. For the Turkish Army, system usage may not be the proper measurement technique for IS effectiveness because of its bureaucratic nature. In addition to that, rules and regulations may impose to use manual information systems along with with the computer based systems.

According to an empirical research [Akar, 2002], documents processed in the formal channels are generally perceived as just papers and the army personnel state that they deal with the formal documents just not to interfere with rules because of the bureaucracy. Akar claims that people in the army generally use informal and oral communication for imperative issues. In other words, whatever its content, a document coming from the formal channels may be recognized as a stack of papers in the Turkish Army. So, validity of an IS effectiveness evaluation performed by only questionnaire documents sent through and collected via formal channels may be in doubt.

Although the mere usage of formal communication channels may decrease the validity of IS effectiveness assessment, formal permission for evaluations may augment the strength of the research and researcher. Because, in the Turkish Army as a hierarchical organization, leaders and management have greater impact on subordinates' performances more than any other organization have [Gökşen, 2001; Daloğlu, 2002]. As Thong et.al (1993) asserted, visible top management support encourages positive attitudes and especially in the Turkish Army top management support both in bureaucratic and informal means may enhance the achievement of the assessment.

3.2 Impact of Local Attributes on IS Effectiveness Assessment

Little et al (2000) claim that cultural issues are becoming more important as the world moves toward increased communication and globalization. Many corporate mergers occur across national boundaries requiring personnel to be more aware of national and ethnic differences. With the growing globalization of business in today's environment, increased multiculturalism has encouraged scholars to examine factors that enhance or inhibit the adaptation of organization and management practices across cultural boundaries [Teng et.al, 1997]. Several authors argue that information systems solutions from the developed world, conveyed by professional, standardization "imperatives" or the emulation of patterns seen elsewhere

successful cannot be replicated in the developing world with the expectation that similar results would also accrue, local adaptations are necessary [Sahay and Avgerou, 2002].

In this work, IS effectiveness an assessment framework will be proposed for the Turkish Army; so, a comparison between Turkey and other countries may enable us to assert some specific arguments and adaptations on IS effectiveness assessment perceptions and techniques.

3.2.1 Turkey as a Developing Country

Ceyhun and Çağlayan(1996) state that Turkey did not experience the industrial age and now is trying to take advantage of the information age but the perceptions are still conventional and these perceptions are standing on short term profits; therefore Turkey will not be able to exploit the benefits of information technology. Uçkan (2003) states that Turkey needs a "paradigm shift" in order to overcome difficulties experienced in information technology. While IT products open new opportunities for developing countries, they also pose a set of new challenges [Yahya, 1993]. Yahya declares those challenges as:

- It is often the case that in developing countries computer systems may be copiers of their manual predecessors and may not exploit the full potential of computers. Computer based information systems and manual systems may be running simultaneously for longer than needed periods.

- Management people may ask for systems with unrealistic characteristics.

- The information system departments are frequently managed by people at the lower echelons of the organizational structure. Computer centers are viewed only as service departments whose job is to respond immediately to any requests by the departments being served.

Like Yahya, Sahay and Avgerou (2002) claim that developing countries have problems in IT use because developing country environments tend to be politically volatile and unstable, decisions around IT projects are often driven by reasons of expediency rather than rationality. Although it is not sensible to claim that Turkey is experiencing the same problems in the same degree as presented above, it may be argued that Turkey still has some problems in exploiting the full potential of computer-based systems. It may enhance the objectivity of assessment to notice if some organizational transformation practices like business process reengineering or total quality management is performed or not to exploit IS effectively. In other words, despite the widely usage of IS development methods and project management tools and techniques, target information system to evaluate may have development phase problems like insufficient requirement analysis, problematic business process modeling or implementation problems. So before IS effectiveness assessment, the evaluator may investigate those aspects to perform a realistic assessment for the system that may involve inherent development problems.

3.2.2 Cultural Dimensions of the Turkish Nation

Based on a study of 50 nations, Hofstede (1980) argues that national cultures differ mainly along four dimensions:

- Individualism: The extent to which people of a country show a propensity to see themselves as self-sufficient individuals(individualist) as compared to a propensity to see themselves primarily as an integral part of a social group(collectivist).

- Uncertainty avoidance: The extent to which people of a country show a tendency to maintain a status quo when feeling uneasy or threatened by situations those are uncertain or ambiguous.

- Power distance: The extent to which people of a country show inclination to accept unequal distributions of power, such as between senior managers and operational level employees.

- Masculinity and femininity: The extent to which the dominant values in society are "masculine" that is assertiveness, the acquisition of money and things, and not caring for others, the quality of life, or people.

Hofstede, in his empirical research, scores countries according to dimensions given. He claims that:

- Power distance in Turkey is higher than the average
- Collectivism in Turkey is higher than the average
- Uncertainty avoidance in Turkey is stronger than average
- Femininity in Turkey is higher than average

Although Hofstede's work is widely accepted, it should be noted that he ranked 50 countries more than 20 years ago, those dimensions are relative and not absolute, and his results are subjected to change over time [Kazan, 2002]. Önen (1999), in an empirical research for the Turkish Army, states that there is a time lag between the original study and the present time, so especially changes in 1980's have influenced the cultural dimensions of the Turkish society. In addition to possible obsoletion, he also claims that it would be very unrealistic to assert that the original sample can give definite characteristics of Turkish community, because the sample of people chosen by Hofstede have considerably higher standards than average Turkish

people, both in education and the other indicators of lifestyle. Hoftstede's sample group consisted of employees in an international computer company. Though Önen (1999) and Kazan (2002) claim that there have been changes in the culture of Turkish people with respect to 1980, they accept that their empirical researches have almost the same results with Hofstede's.

Since "power distance" is higher in the Turkish society, managers may not take into consideration subordinate's perceptions because in "high power distance" societies, superiors (managers) consider subordinates as a 'potential threat to one's power' and 'people to blame'. Another factor related to "power distance" is that in high "power distance" cultures like Turkey, subordinates intend to believe that 'their perceptions are not worth to assert', therefore effectiveness assessment techniques including subordinates' perceptions may be constructed considering those attitudes in the Turkish Army. In addition, because of "high power distance" in the Turkish society, senior level managers generally perceive firm criteria like system or information quality measures more seriously than their subordinates' perceptions. Yeo (1998) claims that in organizations in which the power distance is high, when people of differing status are put in a room together, subordinates talk very little. In addition, Yeo declares that in these organizations a person of higher status and power will be more likely to voice his or her feelings of discontent than one from the lower ranks as a higher ranked person would have less fear of retribution. For the Turkish Army, in interviews or talks, evaluator may choose to be alone with individuals to get better contribution to his work

Since the Turkish society is more "collectivist", employees may not behave independently by not reflecting their observations freely. Also in "collectivist" cultures, 'value standards differ for in-groups and outer groups' [Hofstede, 1980]. Because of these two reasons, employees may not be objective in their attitudes. For example, two employees working together may attempt to fill out the surveys by copying from each other or in an interview, an

employee may not assert his negative ideas about the system because he may have a close friend in IS department. So while implementing surveys or interviewing with users to assess effectiveness, evaluation objectivity may be enhanced considering these points. Another point is that assessment techniques namely observations involving objective criteria are important for collectivist cultures because 'there is emotional dependence of individual on organization and institutions' so employees may not criticize their organization's other departments objectively by surveys conducted generally for "user satisfaction", "system usage", "service quality" measurements.

Since "uncertainty avoidance" is stronger in Turkey, it may be asserted that Turkish people try to 'refrain from conflicts and uncertainties' and they 'search for the absolute truths and values', so managers in the Turkish Army prefer somewhat tangible and concrete measures in assessment of IS effectiveness.

"Femininity" is higher in Turkish Society. It should be pointed out that masculinity and femininity are terms that do not represent gender issues in this context. *Önen (1999) asserts: "Aid for weak is popular in Turkey, which is a strong sign for a feminine culture".* Hence, in the Turkish Army ROI (Return on investment) or other cost-benefit evaluations may not be the proper techniques for IS effectiveness assessment, because Turkish people may not think or behave within the context of financial rationality when constructing a system. Therefore, assessment of investments may indicate inefficiency but in general, it can be claimed that effectiveness does not require efficiency for the Turkish Army.

3.3 Impact of NATO on IS Effectiveness Assessment

For the Turkish Army globalization means international assemblies, namely NATO and other treaties between governments. Since Turkey is an active

member of NATO, the Turkish Army has to comply with NATO standards. There are two significant points regarding IS effectiveness assessment in the Turkish Army related with NATO: First, according to NATO, information systems should be integrated to C2 systems and the second is that armies of different countries have to operate together (systems have to be interoperable). It should be noted that, one of the primary core business domains of the Turkish Army is command and control, for that reason, despite the lack of fully integrated computer based C2 systems in the Turkish Army, this section of the study includes C2 systems and their effectiveness.

3.3.1 C2 Systems

According to AAP-31(2001) (NATO glossary of communication and information systems terms and definitions), a command and control system may be interconnected with a management information system in order to exchange the information required by either system. It may be interpreted from the definition that the core mission of every information system in a NATO army is to produce information for C2 systems. For example, Logistics Information Systems may seem a standalone system for ordnance branch, but in fact this IS has to serve to decision makers before any conflict or operation by representing the current weapon and vehicle state (like the power of weapon systems in terms of quantity, range and ammunition type). In addition, Logistics Information System has to produce actual information (like the current state of damaged/undamaged vehicles or weapons) during an operation. This interpretation leads to two results: Evaluators who want to assess IS effectiveness in the Turkish Army may suppose that an information system is effective only if it serves C2 systems because core mission of the army is defense and defense requires a robust C2 system. The other result is that, it is not easy to establish effectiveness criteria for IS. Because information systems are supposed to have link to C2 systems and evaluators may have to find answer to the questions of "How does an IS contribute to C2 effectiveness? What kind of information do C2 systems need" So,

evaluators may have to set up or select information quality criteria related to C2 effectiveness.). It should be pointed that C2 systems are not only used during wars, but also they are used in the peace conditions for governments' political decisions; therefore, a separation between information systems like peacetime or wartime may not seem realistic

3.3.1.1 Interoperability of C2 Systems

Another important point for an evaluator is that NATO nations operate together and their C2 systems and information systems have to interoperate [Bares, RTO-MP-064, 2001]. Therefore, evaluators have to consider interoperability criteria and the intricate problem is that interoperability is not just a technical level problem but also it requires cooperation ability between services and nations. AAP-6(2004) (NATO Glossary Terms and Definitions) defines combined operation as an operation conducted by forces of two or more allied nations acting together for the accomplishment of a single mission. Beside the coalition operations (combined operation), interoperability issue occurs in the joint operations (Operations in which elements of at least two services (army-air force-navy) operate together.

3.3.1.2 Effectiveness of C2 Systems

As it is stated in the previous sections; according to NATO, an information system may be defined as effective only if it produces information for interoperable C2 systems, but there is not an agreement among the researchers on the attributes of information quality criteria, those C2 systems require. Malerud(1999) claims that a common problem, when analyzing C2 systems, is to relate different measures of merit with each other. In other words, it is complicated to link the performance of subsystems within the C2 systems to effectiveness of C2 systems and further, effectiveness of C2 systems to military operational effectiveness. One major challenge is to link

measures of C2 system performance to the measures of C2 effectiveness and further measures of C2 effectiveness to measures of force effectiveness. In order to deal with this problem it is important that measures of force effectiveness be defined before the measures of performance effectiveness. Figure 8 represents a diagrammatic summary of these relationships.
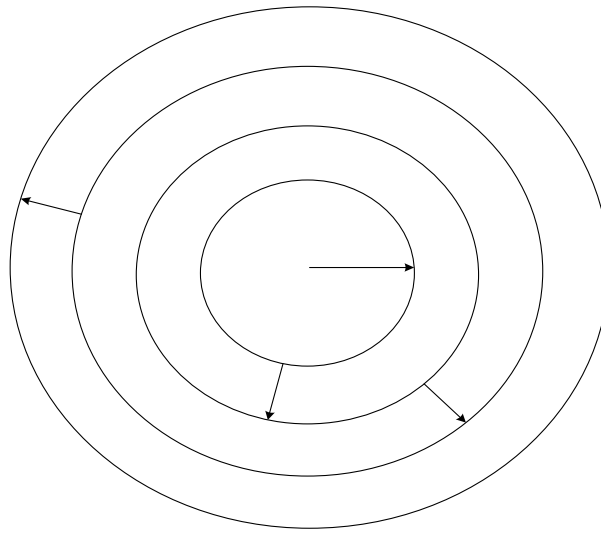
Figure 8 Relationships Among Classes of Measures of Merit

Malerud states that effectiveness should be considered as a top-down issue, that performance is a bottom-up issue. C2 cannot be isolated from the military force of which it is a part and that its only purpose is to contribute to the success of this force's mission. They claim that the distinction between effectiveness and performance shows that effectiveness can only be measured against the accomplishment of the mission. Despite this idea NATO Research Study Group's framework [RTO-TR-9, 1999] involves scenarios to model the mission in the battlefield to assess effectiveness.

Sproles (2001) asserts that C2 systems are socio-technical systems built up of groups of people and equipment and they pose difficult problems because they are often only partially observable, probabilistic, and open; and C2

systems cannot be isolated. He claims that the contribution to mission accomplishment of C2 systems cannot be measured realistically without a real operation. Although there may be some ways like simulations or exercises, it is a fact that there is no war identical to any other in the war history [Malerud, 1999]. Sproles concludes that there is no solution for this dilemma but the approach taken by behavioral or soft sciences may warrant investigation and even without a solution to the problem, the establishment of a theoretical basis to explain what is happening may show a path to be followed when working with C2 systems.

3.4 Summary of the Impacts of Characteristics of the Turkish Army on IS Effectiveness Assessment

In the previous sections possible effects on IS effectiveness assessment paradigms and techniques were discussed in detail, on the other hand, one of the significant contribution of this thesis is the statement of the possible impacts of organizational characteristics on IS effectiveness assessment; therefore in this section, brief and concise explanations about impacts will be presented in table 2.

Table 2 Impacts of the Characteristics of the Turkish Army on IS Effectiveness Assessment

No	Section	Org. Characteristic&Possible Effect on IS Assessment Techniques
1	3.1.1	Cost-benefit analysis may be used in the Turkish Army only if benefits are quantified realistically.
2	3.1.1	Reduced cost does not necessarily imply improved organizational performance for the Turkish Army.
4	3.1.2	Because of different personnel attitudes in the Turkish Army, merely usage of user satisfaction questionnaires is not good enough to capture the perceived effectiveness. Therefore, observations and interviews are necessary for evaluations.

Table 2 Cont.

No	Section	Possible Effect on IS Assessment Techniques
5	3.1.2	The Turkish Army personnel may tend to perceive IS effectiveness as a level of technology. Therefore, probing questions are better than rigid scaled questions in evaluations.
6	3.1.3	The Turkish Army as a public organization operates under certain legal and formal constraints resulting in less autonomy for the personnel. Therefore, evaluator should consider these issues while measuring or assessing the system usage
7	3.1.3	In the Turkish Army, validity of an IS effectiveness assessment performed by only questionnaire document sent through and collected via formal channels may be in doubt. Because documents processed in the formal channels are generally perceived as ineffectual in the Turkish Army.
8	3.1.3	Since the Turkish Army is a hierarchical organization, leaders and management have greater impact on subordinates' performance more than any other organization have. Therefore, top management support in terms of permission and authorization for evaluation may enhance the success of the assessment.
9	3.1.4	Turkey, as one of the developing countries, may have some IT implementation problems like insufficient requirement analysis, problematic business process reengineering to exploit potential benefits. Evaluator considering those points may perform a realistic IS assessment via observations before evaluations.

Table 2 Cont.

10	**3.1.5**	Since the power distance is higher in the Turkish Society, IS evaluations just containing subordinates' perceptions are not seriously taken by senior level managers.
11	**3.1.5**	Since power distance is high in the Turkish Society, people are not likely to voice his or her feelings freely. Therefore, evaluator should prefer being alone with individuals to get better contribution to his study.
12	**3.1.5**	Since the Turkish Society is collectivist in general, personnel may tend to refrain from exhibiting objective comments about IS. Therefore evaluators should let the interviewees digress from the subject to explore the matter and capture the issue.
13	**3.1.5**	Since uncertainty avoidance is stronger in Turkey, questions in evaluations should convey the meaning without conflicts and uncertainties.
14	**3.1.5**	Since "femininity" is higher in the Turkish Society, within the context of evaluation, ROI may not be the proper technique for IS effectiveness assessment.
15	**3.3.1**	Since for an army, information systems has to produce information for C2 systems, top-down IS evaluations should consider this point as an effectiveness measure.

CHAPTER 4

DETERMINATION OF IS MEASUREMENT DIMENSIONS

As stated in the previous chapter, the Turkish Army is a large public organization with some diverse and intangible goals. Therefore assessment of IS effectiveness with a one-dimensional construct may not reflect the realities. A comprehensive model including all other IS success dimensions is necessary for the evaluation framework. DeLone and McLean model (1992) argues that variables of each dimension and interactions between dimensions should be established, "net benefits" should be investigated and these investigations determine the organization specific nature of success framework in specific contexts.

4.1 Comprehensive Representation of IS Setting in the Turkish Army

IS is not a passive or independent organizational entity but on the contrary, it is highly influenced by the conditions around it, as well as highly affecting its organizational surroundings. Some researchers (Bozeman and Strausman, 1990; Newcomer and Caudle, 1991) have investigated the implications of the dependency on the external environment on the evaluation of information systems in public organizations. These writers argue that evaluation of information systems in public organizations must be extended to include those actors in the external environment who can influence these systems. They claim that external factors, or what they call the distal environment

(e.g. political and economic authorities), influence the internal factors in an organization, or what they called the proximate environment which includes variables that are related to the work context and the attitudes and behaviors of individuals in an organization. According to the researchers, this strong external influence on the internal factors is what makes information systems within public organizations different from those in private organizations.

As a result, the widely accepted DeLone and McLean (1992, 2003) model may be used in our context if the relationship between IS and external environment is conceptually defined. Therefore in this section, a comprehensive representation of IS setting will be put forward based on the characteristics of the Turkish Army reviewed in the second chapter. It should be pointed out that this representation is not a model to validate but rather visualization of the accepted specific domains affecting any IS in the Turkish Army.
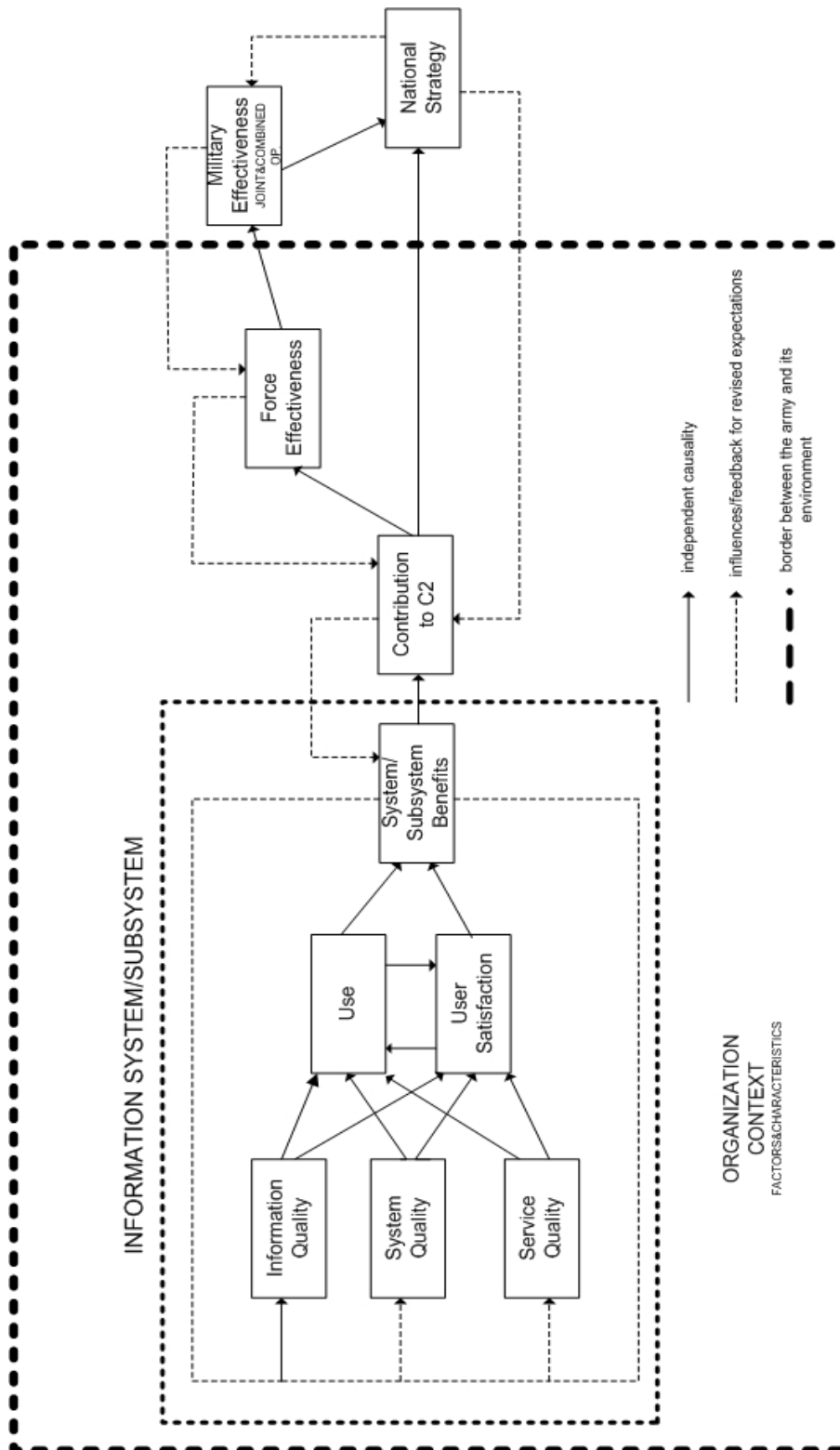
Figure 9 Comprehensive representation of IS setting in the Turkish Army

4.2   Evaluation Methodology Rationale

Many authors have commented that each research strategy has advantages and disadvantages and no strategy is more appropriate than all others for all research purposes [Benbasat, 1987]. The starting point of a researcher's methodological choice within information systems is not so much a problem of how many methods employed or if those are of quantitative or a qualitative nature, but the ability to identify the philosophical and theoretical assumptions which leads to the choice of appropriate methodology

4.2.1 Qualitative vs. Quantitative Research Methods

There is always a debate on quantitative versus qualitative methods. The quantitative approach implies that there is an objective truth existing in the outside world that can be revealed using the scientific method of measuring relationships between different variables systematically and statistically [Garcia and Quek, 1997]. Despite the differences in reference disciplines and the debate over a paradigm for information systems, information systems research is generally characterized by a methodology of formulating hypotheses that are tested through controlled experimental or statistical analysis [Kaplan and Duchon, 1988]. There is a general dissatisfaction with the type of research information provided by quantitative techniques. The satisfaction stems from several sources: the complexity of multivariate research methods, the distribution restrictions inherent in the use of these methods(e.g., multivariate normality), the large sample sizes these methods dictate, and the difficulty of understanding and interpreting the results of studies in which complex quantitative methods are used[Benbasat, 1987]. Quantitative researchers tend to be interested in whether and to what extent variance in X causes variance in Y [Maxwell, 1996]. Using this approach, researchers examine the effects of one or more variables on another. These analyses tend to treat IT as the determining factor and users as passive and

static. Because such studies are restricted to readily measured static constructs, they neglect the aspects of cultural environment and social interaction and negotiation that could affect not only the outcomes but also the constructs under study [Kaplan and Duchon, 1988].

For IS domain, field experimentation should always include qualitative research to describe and illuminate the context and conditions under which research is conducted [Benbasat, 1987]. Qualitative research methods are characterized by the detailed observation and involvement of the researcher in the natural setting in which the study occurs and avoidance of prior commitment to theoretical constructs or to hypotheses formulated before gathering any data. Although qualitative methods provide less explanation of variance in statistical terms than quantitative methods, they can yield data from which process theories and richer explanations of how and why processes and outcomes occur can be developed [Kaplan and Duchon, 1988]. In other words, qualitative researchers tend to ask how X plays a role in causing Y and what is the process that connects X and Y [Maxwell, 1996].

4.2.2 Case Study as a Qualitative Approach

Just as there are various philosophical perspectives, which can inform qualitative research, so there are various qualitative research methods. The choice of research method influences the way in which the researcher collects data. Action research, case study research, ethnography and grounded theory are the methods, which are generally used, in qualitative research [Myers, 1997]. There is a considerable debate on what constitutes good interpretation in qualitative research. In information systems, case studies have been evaluated in order to assess their rigor and validity [Yin, 1994, Benbasat et.al, 1987]. Kaplan and Duchon (1988) argue that case research strategy seems to be the only means of obtaining sufficiently rich data and so the validity of the case study method is better than that of empirical studies.

There are three reasons why case study research is a viable information systems research strategy. First, the researcher can study information systems in a natural setting, learn about the state of the art, and generate theories from practice. Second the case method allows the researcher to answer "how" and "why" questions, that is to understand the nature and complexity of the process-taking place. Third, a case research approach is an appropriate way to research an area in which few previous studies have been carried out [Benbasat et al, 1987].

4.2.3 Semi-structured Interview as a Qualitative Data Collection Technique in Case Study

Case study methods involve systematically gathering enough information about a particular phenomenon to permit the researcher to understand how it operates and functions. Typically, a case study researcher uses interviews and documentary materials primarily [Kaplan and Duchon, 1988].

Located between the extremes of completely standardized (structured-formal) and completely non-standardized (informal, non-directive) interviewing structures is the semi standardized interview. This type of interview involves the implementation of a number of predetermined questions and /or special topics. These questions are typically asked of each interviewee in a systematic and consistent order, but the interviewers are allowed freedom to digress; that is the interviewers are permitted to explore far beyond the answers to their prepared and standardized questions [Berg, 2000].

4.2.3.1 Interview Questions

DeLone and McLean (1992), in order to use their model effectively, made two suggestions: One is to combine individual measures systematically from the

information system success categories (dimensions) for creating a comprehensive measurement instrument. Second, contingency variables such as structure, size and environment of organization should be taken into account when selecting an information system measure of success. They also stress the point that "*variables of each dimension and interactions between dimensions should be established in specific frameworks*".

DeLone and McLean(1992) suggest that arbitrarily selecting measures from each of the dimensions of IS sucess to form an overall IS success measurement is not recommended. Therefore, in this study, selection of success criteria from relevant literature was performed systematically. Although there are many measures proposed by researchers in the IS literature, the list of DeLone and McLean (1992) (See sec. 2.3.5) is accepted as the most comprehensive one [Kappelman, 1997; Seddon, 1999]. Since DeLone and McLean (1992) model did not include Service quality, criteria were taken from Pitt et al (1995) and organizational factors were defined according to the literature reviewed in the second chapter. The problem with the list is that it includes all the criteria suggested by IS researchers (approximately 180 research papers).Therefore some of them were eliminated in the first round.

The eliminated criteria and our reasons for elimination are listed in table 3:

Table 3 Eliminated Criteria

Reason	As it was stated in the previous chapter 3 benefits of the army cannot be priced in the market and reduced cost does not mean improved performance
Criteria	Operating cost reductions, staff reduction, overall productivity gains, increased revenues, increased sales, increased market share, increased profits, return on investment, return on asset, ratio of net income to operating expenses, cost/benefit ratio, stock price, product quality

Table 3 Cont.

Reason	As it was outlined in previous chapter 3 in the Turkish army the system usage may be mandatory and employees may not have autonomy in performing their jobs: so as Srinivasan(1985) states, in some classes of systems use and system effectiveness may indicate two entirely different phenomena.
Criteria	Number of inquires, amount of connect time, number of functions used, number of records accessed, frequency of access, number of reports generated, charges for system use, regularity of use, use vs. no use, use for intended purpose, appropriate use, type of information used, purpose of use, levels of use(generic vs. specific)

After eliminating some of the measures, the list still had various arbitrarily selected criteria. It should be noted that the first and the most important part of qualitative research process is asking the right questions [Fielden, 2003]. In the second round, in order to have valid and reliable questions, measures were mapped to items of validated instruments, so criteria were transformed into valid and reliable question forms. This second round was executed in more than fifty iterations (number of criteria) by trying to assign any item in the instruments (nine instruments including 181 questions) to a criterion. By this process, only the criteria to be evaluated by the "user perceived effectiveness" assessment instruments remained. These instruments are listed in table 4. It should be pointed out that these instruments were accepted as the most valid and reliable instruments among many IS researchers [Baroudi and Orlikowski, 1988; Mahmood and Becker, 1985; Seddon et al. 1999, DeLone and McLean, 2003] in user perceived IS effectiveness assessment.

Table 4 User Perceived Effectiveness Assessment Instruments

Author	Name	Number of Questions
Baroudi and Orlikowski, (1988)	A short form measure of user information satisfaction	13
Sanders(1984)	MIS Success Measure	13
Goodhue (1995)	Task technology Fit and Individual Performance	41
Davis (1989)	Perceived Usefulness, Perceived Ease of use and User acceptance of information technology	12
Doll and Torzadeh (1988)	The measure of End-User computing satisfaction	12
Franz and Robey (1986)	Organizational context, User involvement, and usefulness of information systems	12
Raymond (1985)	Organizational characteristics and MIS success	22
Bailey and Pearson (1983)	Development of a tool for measuring and Analyzing computer user satisfaction	39
Pitt. Et al (1995)	Service quality	22

Appendix A contains a list of all 39 criteria, 181 questions and the sources in the literature where the questions are taken from. It should be pointed out that Appendix A is not just a stack of questions but rather systematic classification of questions from various instruments and this classification is the outcome of previous chapters.

4.2.4 Preparation of Interview Form

In Appendix A, relevant criteria and validated instruments were matched in order to have valid and reliable questions. In other words, 181 questions from user perceived IS effectiveness assessment instruments were grouped under seven categories of IS success. Although the attempt was to categorize questions to use in interviews, they were not viable for using in interviews, because: First, for each criterion there were more than one question. Second, they were in different question forms and they had different Likert-

like scales for answers to use in quantitative analysis. Berg (2000) argues that questions should be standardized, they must be formulated in words familiar to the people being interviewed and questions should accurately convey meaning to the respondent; they should motivate him to become involved and to communicate clearly his attitudes and opinions. Following these suggestions, in the first phase, all of the items were translated into Turkish. In the second phase, duplications were eliminated and questions were reworded as probing questions according to qualitative research techniques. Probing questions are simply probes; provide interviewers with a way to draw out stories that are more complete from subjects. Probes frequently ask subjects to elaborate on what they have already answered in response a given question for example "Could you tell me more about that?" [Berg2000]. An updated version of the interview form with 48 open-ended questions is in Appendix B.

4.2.5 Data Analysis

The fundamental difference between case studies and alternative methods is that the case study researcher may have less a priori knowledge of what the variables of interest will be and how they will be measured [Benbasat et. al, 1987]; therefore analysis phase will be performed during the case study. In the following chapter, usage of the IS effectiveness assessment instrument proposed in this chapter will be evaluated in the context of a case study.

CHAPTER 5

CASE STUDY

In the previous chapters, qualitative research including observations and interviews, was determined as the most effective way for an IS evaluation in the Turkish Army, also an interview form was presented as an elicitation instrument for user perceived effectiveness assessment. In this chapter, a case study carried out in the Turkish Army Academy will be outlined. The main purpose of this case study is to determine key findings of IS success for the Turkish Army. We also expect to develop an evaluation methodology to implement in any unit of the army at the end of this case study. In other words, meanings and areas of interest will be explored throughout the case study. The objective of this case study is not just an implementation of an instrument but rather to develop hypotheses for IS effectiveness and its assessment in the Turkish Amy.

5.1 Crucial Points of a Case Study Implementation

In many instances, investigators do not consider some of the methodological issues. In general, the objectives of the researchers are not clearly specified. In many cases, the data collection method is ambiguous and details are not provided, the reasons for selecting single-case versus multiple-case designs are not explained and the choice of particular sites is not tied to the design approach. Our purpose is that the reader should be able to follow the derivation of any evidence from initial research questions to the conclusions

of the study. The research should move from objectives and questions to assumptions and design choices, to specific data uncovered, and finally to results and conclusions. Readers should be able to follow this path readily. The researcher's reasoning in establishing cause and effect or drawing out hypotheses should be clearly stated and defended. A clear chain of evidence should be established. Yin (1994) emphasizes on the point that for a qualitative research, rather than statistical reliability and the validity of the assessment instrument, assertion of the chain of evidence improves the reliability and validity of the data collected and analysis. For that reason, phases of the case study research is attempted to be asserted in detail and in a sequential way considering the points mentioned above.

5.2   Unit of analysis

Prior to searching for sites, the researcher should determine the unit of analysis being the most appropriate for the project. The researcher should consider what generalizations are hoped for at the research's completion. "Does the researcher hope to generalize to other organizations, individuals or decisions?" for instance, is a critical question for site selection.

After the arrangement of interview questions, Turkish Military Academy was selected as an appropriate site for the case study. Research was conducted within the Turkish Military Academy located in Ankara. This research site was preferred because the scope and aspect of the organization are thought to be compact enough to make the research possible by exploring the analysis in depth. A second reason is that, although the different units of the Turkish Army have dissimilar features, the academy is assumed to represent the entire army's organizational characteristics to   some extent.

Before any research in an organization, it is advised to the researcher to contact the individual with enough authority to approve the study. Following this proposition, prior to the case study in Military Academy, to have formal

consent for observation and interviews with the users, a letter of application involving the purpose of the research and interview topics was sent to the Commandant of the Military Academy. Within three weeks, permission was given with an order of command document, which declares the acceptance of the research request, and approval of the subject research stating that the subject of the study is of great importance of service for the organization and the research does not interfere with intelligence constraints that are vital for military. The same order was sent to IS department (OBS Şube) to enable the cooperation, by the commandant of Military Academy. This permission enabled the cooperation with IS department's and other department's employees. In addition, assignment of a contact person and his support is very important for a case study research. A contact person was assigned for the coordination by IS department. Another copy of the request was sent to the Headquarter of Army Commandant by the Turkish Military Academy. Processing of obtaining formal consent enabled to diffuse "IS effectiveness phenomena" to the army to some extent, so one of the purpose of the IS evaluations was realized to a degree.

5.3   Observation

An observation is necessary before interviews in the Turkish Army (see Sec. 3.4). During the first phase of the study, it was investigated in the military academy that there is at least one PC for each staff and these computers are linked via a network. In other words, every department/unit is connected with each other. Despite the physical integration of computers, in fact, there is not a top-down or organizational computer based information system involving all the sub-functions or departments of the Military Academy. It can be asserted that, in the Military Academy, IS planning is not an overall effort but rather local or function specific automation implementations by IS department. Although there are some subsystems working together managing the same data/information, it is common that the same data would be produced, saved or replicated in various departments of the academy without considering the

integration. From the current IS discipline perspective, at the first glance, information system in the Military Academy can be categorized as "ineffective" because there is no top-down approach, business processes are not optimized but only some of them automated and these automated sub-functions or applications seem as archipelago with limited integration. The problem with this perspective is that defining the Army Academy's IS as "all ineffective" means defining all the efforts of IS department more than ten years as "all useless" but making such a categorization is always problematic. Therefore, in this phase, the case study was frozen for a while and relevant IS literature especially dealing with some other countries' or organizations' IT/IS diffusion practices and experiences were studied in depth.

5.3.1 Top-Down versus Bottom-up Approaches in IS Implementations

Definition of IS effectiveness does impose us to look for or determination of "organizational goals". We may infer from the definition that the effectiveness of an information system can be assessed by measuring the degree of contribution of IS to organizational goals. After performing the first observation, we may say that IS in the Military Academy is ineffective because there is no top down approach regarding the organizational goals. The question in mind in this section is that "Is it reasonable to categorize an IS as ineffective if the approach is not top-down?"

Rational top-down methods are widely espoused for planning and implementation. With rational, top-down approaches, the problem needs to be carefully analyzed, goals clearly stated and set, alternatives examined, and a strategy suggested by a specialist before being approved by top management. For example, BPR advocates the redesign of business processes using enabling IT to bring about a quantum leap in performance.

It should be pointed out that, information system's contribution to organizational performance is a very complex issue that requires the consideration of some other organizational factors. Macro studies of such ambiguity may be due to the problem of measurement. Another reason could be that studies at an aggregate level have not considered the intermediate level of impact of IS and rather tried to relate directly to output variables. On the other hand, public organizations rely more on appropriations and less on market exposure, there is lower availability of market indicators and information. This results in increased difficulties in setting BPR objectives and benchmarking in designing alternative processes, and selecting the redesigned processes by a top-down approach determining tangible targets of organization. Another problem with the BPR is that public organizations operate under legal and formal constraints. This increases the difficulties in redesigning procedures to support the redesigned processes. Due to the greater technology toward proliferation of formal specifications and controls, a longer period is required for specification and approval of redesigned procedures. Furthermore, the rigid incentive structure in public organizations will present difficulties in redesigning the human resource management system to support the redesigned processes. Traditional systems analysis is often as too slow and too resource consuming for getting computers into use. Ordinarily, in a top down approach, everyone must wait for the systems analysts to study and produce an application.

Although much of the organizational and design literature supports a systemic and structured approach for implementation, regardless of whether it is for computers or some other technology, there is a literature that recognizes naturalistic or loosely structured, individualistic, spontaneous and impromptu approaches to implementation. In this open, loosely structured environment, individuals are able to experiment and develop applications quickly. However, letting every staff member go his or her own way raises its own set of difficulties. The microcomputer adds to the archipelago nature of information technology in organizations, that is, the computer affixes another

technology that is not automatically nor easily connected to the existing information systems [Sacco, 1994]. The modifications are very costly and frequently result in the violation of data integrity. Another problem is that the reliance of the organization on the individuals who implemented the system especially in view of the common practice of having single individual responsible for all the stages of system design and implementation. As a result, the practice of scrapping the whole system and replacing it by a new one is common. The solution to these limitations is not necessarily to abandon or discourage the loosely structured approach but to consider it as both an integral part and stage in the implementation of IS. Adaptations are possible without foregoing or suppressing experimentation.

In addition to these perspectives, another view is based on the idea that effective planning can be neither exclusively bottom-up nor top-down, but both. Top-down, centralized planning and bottom up implementation conducted by the IS department has an important, even critical role, especially in large organizations. The construction of a single standardized IT architecture and infrastructure is a crucial step for the successful integration of systems throughout the organization. It provides the foundation upon which aligned business and technology strategies can be built.

Considering these perspectives, it can be argued that, individual or island-like IS efforts cannot or should not be evaluated as "not effective" despite the lack of top-down approach, at the first shot. The realistic view may be to evaluate every organization and IS implementation effort by determination of a reference within the context of organization itself and this approach may enhance the validity of assessment.

5.3.2 IS Maturity as a Reference for Evaluation

In the computer implementation realm, there are efforts to accommodate both the top-down and the bottom-up approaches. Some of these come from work by Gibson and Nolan (1974), McKenney, and McFartlan (1982). They suggest that the early stages of instituting information technologies are typically unstructured and experimental. Once users and managers feel comfortable with new technologies, they enact more control over the design and use of these technologies.

According to Nolan's Stage Hypothesis Model (1973) an information system may be placed in different stages. It should be pointed out that there is no clear-cut or rigid line between the stages, but this taxonomy may help us to understand the "growing IS" matter (See Sec. 2.4.10).

5.3.3 Determining Operational Key Constructs of Assessment within the Context of Research Site

As the basis of this research, the DeLone and McLean model categorization is product oriented. They assert the causal relationships that exist between the categories of measurement. However, the maturity of IS in the military academy do not allow us to take DeLone and McLean model as process based. The other problem with the model is that we cannot use the model as variance model because we preferred qualitative research and no prior researches were conducted asserting variance hypotheses between the categories of the model for the IS in the Military Academy.

In the IS effectiveness literature it is argued that as the organization's IS move on to higher stages effectiveness increases. In other words, an IS is accepted as more effective than the one which is not mature. Organizations should persist with the requisite investments in IT in the initial stages, with adequate managerial controls, to build a platform to experience significant

benefits of information systems in the end. We may conclude that organizations should expect large scale benefits from IS only after stable organization wide IS, supported by the necessary technical infrastructure and an established IT management set up. In general, organizations need to reach the stage 5, or beyond to experience IT enabled advantages that enhance organizational effectiveness as opposed to increasing efficiency only. Although in the IS effectiveness literature it is pointed out that IS effectiveness increases as the IS moves on to higher stages it is not offered an explicit comment on how the term "effectiveness" change according to the stages.

As pointed out by DeLone and McLean (1992), without a well-defined dependent measure, researchers cannot be confident in their results and much of the research is indeed purely speculative. Establishing sound theoretical formulations for concepts of IS success has been strongly advocated by IS researchers. Although conceptual definitions of IS effectiveness are relatively consistent, operational definitions are not. In view of the Nolan's stage hypothesis, it may be asserted that the IS in Military Academy is between the third and fourth stages. In other words, sub-systems are needed to be integrated and a higher service quality is vital. Considering these issues, dependent variable of the research would be "moving to next phase" in terms of IS maturity and our independent variables would be "flexibility of systems" and "system integration" which are asserted in Delone and Mclean (1992-2003) model but they are mentioned with other arbitrarily selected measures. The definition and conceptual refinement of a dependent variable for IS is the central of the development of IS field. On the other hand determining a few criteria do not mean that the researcher will try to measure these but rather will attempt to investigate the mutual dependencies with other criteria. Although this phase was asserted before the interview phase, qualitative methods are characterized by the detailed observation and involvement of the researcher in the natural setting in which the study occurs and it is avoided prior commitment to theoretical constructs or to hypotheses

formulated before gathering any data. In other words, some of these findings appeared after performing several interviews; in fact, the collection and the analysis of the data obtained go hand-in-hand as theories and themes emerge during the study.

5.4 Data Collection/Interviews

After the observation phase, interviewees were determined with contact person assigned by OBS department. Interview form was used in order to carry out the research. Initial design was left open for modifications and extensions as necessary during the course of the study's duration. Therefore, after the conduct with first three users, it was noticed that some questions could not convey the meaning and some of them were replicated so interview form was modified for better exploration. For each system, interviews were conducted with the users following the questions in the interview form but interviewees were allowed to digress by probing questions to explore the subject.

5.4.1 Personel Bilgi Sistemi (PBS)

The purpose of personnel information system is to maintain personnel data and generate reports on demand. Although there are three types of users only the operators (VHKİs-Veri Hazırlama Kontrol İşletmeni) of subunits are responsible to update the personnel information. There are 101 VHKIs using the system. Interviews were conducted with six of the VHKIs (so called "System admin") and a non-commissioned officer as admin.

The system holds data for personnel (approximately 1000 except cadets) in 24 fields.
There are three types of user:

- User: All of the personnel in the military Academy. This type of users may see his personal information, update his/her personal info and get reports about himself

- Admin: This authority is given to a person from Personnel department and

- System admin (VHKI): This is the person in every unit. This type of user is responsible for updating his/her subunits personnel information. In addition, he/she may get the reports on his department.

VHKIs are generally do not consider the system as "relevant", they declare they have manual filing systems and they can use the manual system on demand.

Problems areas

- **System Quality**
  - **System accuracy:** Because of insufficient update, system sometimes may produce inconsistent information.
  - **System flexibility:** Users ask for new system attributes like new data fields but, since the system has some adaptation problems, change requests are not realized.
  - **System integration:** Users do not expect the system to be integrated with other systems.

- **Information Quality**
  - **Report format:** Users ask for new report formats although they know that system has the ability to produce various report styles.
  - **Information Currency:** Admin sometimes has to warn the users (VHKi- Veri Hazırlama Konrol İşletmeni) to update the fields related to their department or unit.

- **Service Quality**
  - ➢ **Responsiveness (Processing of change requests):** Although all of the users are satisfied with the attitude of the IS staff, generally they claim that processing of change request is not enough. They claim that IS department personnel put forward the problem of inflexibility of the system.

- **Use**
  - ➢ Users (VHKİ) perceive the systems as not so necessary for their jobs.

- **User Satisfaction**
  - ➢ Users do not have the idea of usefulness but rather compare with the previous system and declare that this system is better, because it is easy to use.
  - ➢ Users do not have the idea about the term "effectiveness" in other words they do not think about its usefulness.

- **Net Benefits**
  - ➢ Since the managers do not use it directly and they use it as chauffeured via Operators, it could not be determined whether it is useful for decision-making or not.
  - ➢ Users claim that these systems do not contribute to their individual and task performance. They claim that they have manual filing systems and it is not a vital system for them.
  - ➢ Users claim that they do not adhere to system because they have the manual failing system.

- **Organizational Factors**
  - ➢ Admin sometimes have problems because of insufficient updating of users (VHKİ) and he warns the head of the related department.

5.4.2 Nizamiye Bilgi Sistemi (NBS)

NBS is operated by operators in the main entrance (nizamiye) of the Turkish Military Academy. The purpose of the system is to register visitors and vehicles to regulate the entrances and to enable security and control. Visitors submit an ID card or vehicle license and operators register, and then the visitor can enter to academy with or without his vehicle. There are five operators using it in two entrances and they get reports from the system and submit to the headquarter if claimed. Beside the operators, also senior officers working in the headquarters can access to system to get the daily and temporary status of visitors. Interviews were held with three operators and two senior officers.

It may be argued that users are generally satisfied with the system, and they perceive the system as useful. There is no manual system being used simultaneously with the NBS.

Problem areas
- **System Quality**

  ➢ **System flexibility:** System is not flexible to change or to adjust in response to new requests. Users demand some minimal changes for the system but the IS department cannot modify the application because the system is not flexible.

- **Information Quality**
  ➢ **Report format:** Users request different report formats but the IS department cannot modify the system.

- **Service Quality**
  ➢ **Responsiveness**(Service Time):IS department does not exactly tell when the servers are under maintenance, so users have to manually

record the visitors, then they enter this info to system, but it does not occur often.

➤ **Responsiveness** (Processing of change requests): Change requests for the existing system are not executed because of the system's inflexibility.

5.4.3 Revir Bilgi Sistemi (RBS)

Military academy has a special infirmary servicing to personnel for firt step medical services(including cadets). Infirmary Information System may be called as dead because now computer-based system is not used at all. Only the emergency function of information system is used. Infirmary Information system was implemented in 1994 but in a few years personnel left it. Therefore, form was not used to interview with the users. Since there is an ongoing study on a new infirmary information system by IS department, only an interview was conducted with the system developer. An information system officer is assigned for all the phases of development. Now he is in the requirement elicitation phase and he is investigating the causes of the death of previous system. He declares that there are some strict bureaucratic rules and there is some paperwork that has to be performed by personnel for sick-call procedure. For example if a cadet applies for sick-call, his/her company leader (a captain) has to fill out a form and has to sign it according to the rules, when the cadet goes to infirmary, practitioner medical doctors have to fill out a form, sign it and director of the infirmary has to approve it and save it for archive for future evaluations. Therefore, paperwork has to be performed by all of the stakeholders. Now Army academy infirmary is preparing a change request for using only computer based information system and now IS department is waiting for the response from General Staff Headquarters. If the request is accepted, all the paperwork will be left. IS department personnel argues that eliminating manual system and redesigning the system

according to new processes will enhance the effective usage of the new system. Because there will be no alternative way and the users will not be liable for not using forms which are now obligatory for them.

5.5 Data Analysis

For a qualitative research, it is not possible to determine the boundaries of data collection and data analysis phases strictly. So, in the observation phase, key constructs for the IS effectiveness in the Military Academy were accepted as "flexibility" and "integration" to reach the more mature stage for the system. However, relation of those key constructs to other factors could not be clarified explicitly. Therefore, in this section a reference or definition describing the "successful" and "unsuccessful" systems will be presented using interview scripts to clarify the vague points.

5.5.1 Constant Comparison Method for Analysis

Glaser and Strauss introduced the constant comparison method in 1967. This method has been used in qualitative analysis by a number of researchers. They give the fundamentals of the constant comparison method in qualitative research as:

- The method is used to reach a grounded theory

- The basic strategy of the constant comparative method is to continually compare a particular incident from data with another incident in the same set or another set of data in terms of similarities and differences.

- In the constant comparative method, the ongoing comparisons of incidents in data lead to creating categories.

- In grounded theory research, comparisons are constantly made (by using the constant comparative method) within and between levels of conceptualization until a theory can be formulated

Literature is reviewed continuously throughout data collection and analysis sample includes people who are experiencing the social process being investigated. When describing the findings, descriptive language must be used to provide the reader with the steps in the process and the logic of the method. Data are compared continuously with other data (constant comparison method) to detect emerging categories and themes and to direct the data collection process.

5.5.2 Analysis Results and Finding Rationales

After the case study some propositions may be asserted for IS in the Military Academy. It should be noted that these propositions (except 1 and 2) are based on rational behavior of humans. The rational model of human behavior is built on the idea that people, organizations, and nations engage in consistent, value maximizing calculations or adaptations within certain constraints. The rational model claims that people establish goals, examine all alternatives, and choose the best alternatives. Despite the criticisms, the rational model remains a powerful and attractive model of human behavior.

Propositions:

P1. Information system assessment cannot be performed with top-down approach by determining the system's contribution to organizational effectiveness, because the system is not mature yet.

P2. Assessments just performed by user-satisfaction questionnaires may be prone to errors because end users are not responsive enough to get reliable results. Their perceptions are still challenging.

P3. If a manual system exists along the computer-based system, users tend to use the manual system that they are used to.

P4. Revision of formal regulations and rules is necessary for the users to make them leave the manual system

P5. Users in hierarchically higher levels, enhance the prospect of system's success.

P6. User expectations are shaped by previous systems, however, if a system is used without an alternative, users convey their needs to IS departments for modifications for their evolving needs

P7. Technological infrastructure i.e. network and personal computers are sufficient but inflexibility of some applications hinder to respond the evolving needs of users.

Proposition Rationales:

Personel Bilgi Sistemi(PBS) is perceived by users as useless. Users claim that this system does not contribute to their individual and task performance. They claim that they have manual filing systems and it is not a vital system for them. Users run a manual system simultaneously and therefore some of them do not use it, this causes two problems:

- Since there is an alternative system, users do not notice their evolving needs and do not feedback to IS department, so the system does not

evolve and some users prefer manual system because of inefficiency of the system.

- Since some of the departments' users do not use the system, there may be some inconsistencies and other users may have integrity problems and this problem causes some of the users to return to the manual system.

Although Admin warns the users to update the system, since the users do not perceive the system as relevant, some of the users insist on not to use it.

Nizamiye Bilgi Sistemi (NBS) is perceived as useful by its users. It may be argued that users are generally satisfied with the system, and they perceive the system as useful. There is no manual system being used simultaneously with the NBS. The main problem with system is that the system is not flexible to change or to adjust in response to new requests. Users demand some minimal changes for the system but the IS department cannot modify the application because the system is not flexible. Therefore, users manually prepare some of the reports.

Revir Bilgi Sistemi(RBS) may be called as dead because now computer-based system is not used at all. Only the emergency function of information system is used. The difference between the emergency function and the main system is that stakeholders do not have to use manual system in emergencies.

We may conclude that if a system has a manual alternative as in PBS (Personel Bilgi Sistemi) and if the personnel have to use the manual systems because of legal obligations, users prefer using the manual system, which they are used to. If some of the users give up using the system, problems occur like inconsistent data and these problems cause other users to give up using the system. So the system is not used and   feedback channels for

evolvement requests are not conveyed to IS department, at the end the system becomes "useless" and dies as in RBS (Revir Bilgi Sistemi).

If the system does not have a manual alternative as in NBS(Nizamiye Bilgi Sistemi), users have to use the system and they transmit their needs. On the other hand, if the system is not flexible, The IS department can not process change requests and the users have to use the system but the system does not satisfy them in a time.

If the system does not have a manual alternative and if the system is flexible then the subsystems are integrated, in other words the system grows and the organization's IS move to higher maturity stages. At the end, organizational benefits may occur.

CHAPTER 6

CONCLUSION

6.1 Research Findings

In this thesis we intended to develop an IS effectiveness assessment framework for the Turkish Army. To start with, international IS effectiveness assessment literature was reviewed; evaluation techniques, paradigms and effectiveness factors were discussed in a comparative manner (Ch 2). Possible effects of characteristics of the Turkish Army on IS effectiveness were discussed (See sec 3.4, table 2). Observations and interviews were determined to be the most appropriate way of data collection. For that reason an interview form was developed on the basis of some other validated instruments (Appendices A and B). Qualitative approach was justified in order to evaluate IS effectiveness in the army. Our evaluation methodology can be summarized in four-step process:

- Observation of the system,

- Definition of the dependent and independent success variables according to "maturity level",

- Interviewing with the users/stakeholders using the "interview form",

- Analysis of the collected data -"Qualitative Analysis".

At the end of the study, proposed evaluation instrument and methodology were carried out as a case study in the Military Academy for IS effectiveness assessment (Ch 5). It should be pointed out that, although the nature of the case studies do not permit generalizations, we may conclude that the propositions may be accepted as "key findings" for the other units of the army, because the bases of this study are constructed with the scopes asserted for the whole army (Ch 3).

The propositions and their justifications were presented in the previous chapter in detail; these may be summarized as follows:

- Information systems and their users are not apt to implement just goal based top-down cost-benefit analyses or quantitative user perceived effectiveness assessments based on generic instruments,

- Observations and semi-structured interviews are the favorable data collection methods for the IS evaluation in the Turkish Army,

- "Dependent variable" of IS success in The Turkish Army is "growing and moving to next stage" in terms of maturity. Independent variables are "flexibility" in "System Quality" and "processing of change requests" in "Service Quality",

- Manual alternatives for the computer based information systems inhibit the growing of the computer based system and in the long term.

6.2 Potential Contributions

There might be two perspectives for the potential contributions of this thesis. One perspective is from the standpoint of the Turkish army:

• Main contribution of this study beside the research findings is that it is the first systematic study performed within the Turkish Army on the subject of IS effectiveness assessment and this is the first study that has the subject of "IS effectiveness" in the agenda in formal communication channels.

• Despite the emphasis upon user satisfaction in the Turkish Army for information systems, there has been no structured instrument for elicitation of needs and perceptions from the users. The Military Academy IS department personnel have now decided to use the interview form developed in this thesis for feedback in order to evolve their systems.

From the IS research perspective:

• The applied methodology is the compound of user-centered and goal-based evaluations so we assume that our methodology surpasses the limitations of goal-based and user-centered evaluations and makes use of the advantages of both approaches in a qualitative manner.

• Classification of instruments in a unique body (Appendix-A) is the first attempt for measurement of all of the Delone and Mclean Model's success dimensions.

• Even though in almost every IS effectiveness research, organizational characteristics are pointed as one of the most important aspects of IS effectiveness assessment in order to determine the dependent and independent success variables, because of the difficulty of formulating measures of effectiveness for complex socio-technical systems, the

methodology on how to do it is not clearly and explicitly explained. Such an incorporation of tangible and intangible elements is not easily achieved. In this study, this integration is explicitly expressed and implemented in a case study.

- Another contribution is the proposition that "effectiveness assessment should be performed according to the IS maturity level". Although in previous studies a contextual relationship between IS effectiveness and IS maturity is asserted, we could not trace any other conceptual work that declares that IS maturity impacts IS effectiveness assessment variables.

- Generally, this type of evaluations' results carry out an intrinsic ambiguity and the method is not explicit. On the contrary, our study may be an example of a qualitative research in information systems area from conceptual base to implementation, systematically. Especially in qualitative IS researches, authors refrain from asserting the elicitation instrument and justification of their findings in detail.

6.3   Assumptions and Limitations

Currently, the IS in the Turkish Military Academy is not mature, in the sense that, not all of the business process are optimized before IT applications and not all the subsystems are integrated. Therefore, if the system grows in the future, dependent variable of "moving to next stage", independent variables of "system flexibility" and "processing of change requests" may not be valid for prospective evaluations.

In this study, selection and elimination of criteria were performed exclusively by the author based on opinions gathered through the literature and case study. The author is aware that while this was necessary due to the nature of the dissertation, it may have somewhat reduced the validity of the proposed

instrument. A Delphi type panel of experts would possibly enhance the applicability and strength of the proposal.

6.4 Future Research and Conclusion

Since this study presents a theoretical background for users' attitudes in the Turkish Army, if an instrument is developed considering the attitude issues, quantitative analyses based on user perceived assessments may be applied for subsystems.

If the forthcoming researchers succeed to build a comprehensive analytic model for the Turkish Army, there might be means to quantify the goals and benefits, so better evaluation methodologies may be developed in the future.

We may conclude that if the Turkish Army persists in IT investments with rational evaluations, large scale and significant benefits may be   expected in the long run as the information systems move to higher/more mature stages.

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APPENDICES

A. Classification of Assessment Instruments

1 System Quality

- **Ease of use**
  - ➤ I would find it easy to get XX to do what I want it to do[Davis, 1989]
  - ➤ I would find XX easy to use[Davis, 1989]
  - ➤ Is the system user friendly?[Doll and Torzadeh, 1988]
  - ➤ Is the system easy to use?[Doll and Torzadeh, 1988]
  - ➤ To what extent is the system troublesome for you, or difficult to operate, or to interact with, in order for you to get information to accomplish your job? [Franz and Robey, 1986]
  - ➤ The computer systems I use are convenient and easy to use[Goodhue, 1995]
  - ➤ I would find XX to be flexible to interact with [Davis, 1989]
  - ➤ My interaction with XX would be clear and understandable[Davis, 1989]
  - ➤ It is easy to locate corporate or divisional data on a particular issue, even if I haven't used that data before[Goodhue, 1995]
  - ➤ It is easy to find out what data the corporation maintains on a given subject[Goodhue, 1995]

- **Ease of Learning**
  - ➤ It is easy to learn how to use the computer systems I need[Goodhue, 1995]
  - ➤ Learning to operate XX would be easy for me[Davis, 1989]
  - ➤ It would be easy for me become skillful at using XX[Davis, 1989]

- **Convenience of access**
  - ➤ Data would be useful to me is unavailable because I don't have the right authorization [Goodhue, 1995]

➢ Getting authorization to access data that would be useful in my job is time consuming and difficult [Goodhue, 1995]

➢ Convenience of access[Raymond,1985]

➢ Convenience of access: The ease or difficulty with which the user may act to utilize the capability of the computer system[Bailey and Pearson, 1983]

• *System Accuracy*

➢ Is the system accurate ?[Doll and Torzadeh, 1988]

➢ Are you satisfied with the accuracy of the system?[Doll and Torzadeh, 1988]

➢ Error recover: The methods and policies governing correction and rerun of system outputs that are incorrect [Bailey and Pearson, 1983]

• *System Flexibility*

➢ The capacity of the information system to change or to adjust in response to new conditions, demands, or circumstances[Bailey and Pearson, 1983]

• *System Reliability*

➢ I can count on the system to be "up" and available when I need it[Goodhue, 1995]

➢ The computer systems I use are subjected to unexpected or inconvenient down times, which makes it harder to do my work[Goodhue, 1995]

➢ The computer systems I use are the subject to frequent system problems and crashes[Goodhue, 1995]

➢ Security of Data: The safeguarding of data from misinterpretation or unauthorized alteration or loss[Bailey and Pearson, 1983]

- *Integration of systems*
  - ➢ There are times when I find that supposedly equivalent data from two different sources inconsistent[Goodhue, 1995]
  - ➢ Sometimes it is difficult or impossible to compare or consolidate data from two different sources because the data is defined differently[Goodhue, 1995]
  - ➢ Integration of systems: The ability of systems to communicate transmit data between systems servicing different functional areas [Bailey and Pearson, 1983]
  - ➢ When it's necessary to compare or consolidate data from different sources, I find that there may be unexpected or difficult inconsistencies[Goodhue, 1995]

- *Response/turnaround time*
  - ➢ Response/turnaround time: The elapse time between a user initiated request for service or action and a reply to that request. Response time generally refers to the elapsed time for terminal type request or entry. Turnaround time generally refers to the elapsed time for execution of a program submitted or requested by a user and the return of the output to that user [Bailey and Pearson, 1983]
  - ➢ Response/turnaround time[Raymond, 1985]

2 Information Quality

- *Relevance*
  - ➢ Relevancy of output information(to intended function)[Baroudi and Orlikowski, 1988]
  - ➢ Does the system provide reports that seem to be just about exactly what you need?[Doll and Torkzadeh, 1988]
  - ➢ Relevancy of output information (to intended function) [Raymond, 1985]

➢ Relevancy: The degree of congruence between what the user wants or requires and what is provided by the information products and services[Bailey and Pearson, 1983]

➢ The data maintained by the corporation or division is pretty much what I need to carry out my tasks [Goodhue, 1995]

- *Usefulness*

➢ To what extent do data that you actually use the reports or output that are provided to you by the system? [Franz and Robey, 1986]

➢ To what extent does this system provide reports to you that seem to be just about exactly what you need? [Franz and Robey, 1986]

➢ The computer systems available to me are missing critical data that were very useful to me in my job[Goodhue, 1995]

- *Clarity*

➢ Is the information clear?[Doll and Torzadeh, 1988]

➢ The exact definition of data fields relating to my tasks is easy to find out[Goodhue, 1995]

➢ On the reports or systems I deal with, the exact meaning of data elements is either obvious, or easy to find out [Goodhue, 1995]

- *Format*

➢ Do you think the output is presented in a useful format?[Doll and Torzadeh, 1988]

➢ Format of the output: The material design of the layout and display of the output contents[Bailey and Pearson, 1983]

➢ Language: The set of vocabulary, syntax, and grammatical rules used to interact with the computer system[Bailey and Parson, 1983]

- *Accuracy*

➢ Accuracy of output information [Baroudi and Orlikowkski, 1988]

➢ To what extent do the data that you receive from this system require correction? [Franz and Robey, 1986]

➢ Accuracy of output information[Raymond, 1985]

➢ Accuracy: The correctness of the output information[Bailey and Pearson, 1983]

• *Precision*

➢ Precision of output information [Baroudi and Orlikowkski, 1988]

➢ Does the system provide the precise information you need?[Doll and Torkzadeh, 1988]

➢ Precision of output information[Raymond, 1985]

➢ Precision: The variability of the output information from that which it purports to measure[Bailey and Pearson, 1983]

➢ The company maintains data at an appropriate level of detail for my group's tasks[Goodhue, 1995]

➢ Sufficiently detailed data is maintained by the corporation or division[Goodhue, 1995]

• *Conciseness*

➢ To what extent does this system overload you with more data than it seems you can possibly use? [Franz and Robey, 1986]

➢ Volume of the output: The amount of information conveyed to a user from computer-based systems. This is expressed not only by the number of reports or outputs but also by the voluminousness of the output contents[Bailey and Pearson, 1983]

• *Sufficiency*

➢ Does the information content meet your needs?[Doll and Torkzadeh, 1988]

➢ Does the system provide sufficient information?[Doll and Torkzadeh, 1988]

- *Completeness*
  - ➢ Completeness of output information [Baroudi and Orlikowkski, 1988]
  - ➢ Completeness of output information[Raymond, 1985]
  - ➢ Completeness: The comprehensiveness of the output information content [Bailey and Pearson, 1983]

- *Reliability*
  - ➢ Reliability of output information [Baroudi and Orlikowkski, 1988]
  - ➢ Reliability: The consistency and dependability of the output information[Bailey and Pearson, 1983]
  - ➢ Reliability of output information[Raymond, 1985]

- *Currency*
  - ➢ Does the system provide up-to-date information? [Doll and Torkzadeh, 1988]
  - ➢ Currency: The age of the output information[Bailey and Pearson, 1983]
  - ➢ I can't get data that is current enough to meet my needs. [Goodhue, 1995]
  - ➢ The data is up to date enough for my purposes[Goodhue, 1995]
  - ➢ Currency(up-to-dateness) of output information[Raymond,1985]

- *Timeliness*
  - ➢ Do you get the information you need in time? [Doll and Torzadeh, 1988]
  - ➢ Timeliness of information system [Raymond,1985]
  - ➢ Timeliness: The availability of the output information at a time suitable for its use[Bailey and Pearson, 1983]

3 Service Quality

- *Tangibles*
  - ➤ IS has up-to-date hardware and software[Pitt. et al, 1995]
  - ➤ IS's employees are well dressed and neat in appearance[Pitt. et al, 1995]
  - ➤ The appearance of the physical facilities of IS is in keeping with the kind of services provided[Pitt. et al, 1995]

- *Reliability*
  - ➤ When IS promises to do something by a certain time, it does so[Pitt. et al, 1995]
  - ➤ When users have a problem, IS shows a sincere interest in solving it[Pitt. et al, 1995]
  - ➤ IS is dependable [Pitt. et al, 1995]
  - ➤ IS provides its services at the times it promises to do so[Pitt. et al, 1995]
  - ➤ IS insists on error-free-records [Pitt. et al, 1995]
  - ➤ IS, to my knowledge, meets its production schedules such as report delivery and running scheduled jobs [Goodhue, 1995]
  - ➤ Regular IS activities(such as printed report delivery or running schedule jobs) are completed on time [Goodhue, 1995]
  - ➤ Schedule of products and services: The IS center timetable for production of information system outputs and for provision of computer based services[Bailey and Pearson, 1983]

- *Responsiveness*
  - ➤ IS tell users exactly when services will be performed [Pitt. et al, 1995]
  - ➤ IS employees give prompt service to users [Pitt. et al, 1995]
  - ➤ IS employees are always willing to help users [Pitt. et al, 1995]

➢ IS employees are never too busy to respond to users' requirements[Pitt. et al, 1995]

➢ Processing of change requests: The manner, method, and required time with which the IS staff responds to user requests for changes in existing computer based information systems or services [Bailey and Pearson, 1983]

➢ Processing of requests for changes to existing systems [Baroudi and Orlikowski, 1988]

➢ Time required for new development: The elapsed time between the user's request for new applications and the design, development, and/or implementation of the application systems by the IS staff [Bailey and Pearson, 1983].

➢ It often takes too long for IS to communicate with me on my request[Goodhue, 1995]

➢ I generally know what happens to my request for IS services or assistance or whether it is being acted upon[Goodhue, 1995]

➢ When I make a request for service or assistance, IS normally responds to my request in a timely manner[Goodhue, 1995]

➢ Time required for new systems development[Raymond, 1985]

➢ Processing of requests for changes to existing system[Raymond,1985]

- *Assurance*

➢ The behavior of IS employees instills confidence in users [Pitt. et al, 1995]

➢ Users will safe in their transactions with IS's employees [Pitt. et al, 1995]

➢ IS employees are consistently courteous with users [Pitt. et al, 1995]

➢ IS employees have the knowledge to their jobs [Pitt. et al, 1995]

➢ Technical competence of the IS staff: The computer technology skills and expertise exhibited by the IS staff [Bailey and Pearson, 1983]

➢ Technical competence of IS staff[Raymond, 1985]

- *Empathy*

➢ The IS people we deal with understand the day-to-day objectives of my work group and its mission within our company[Goodhue, 1995]

➢ IS delivers agreed upon solutions to support my business needs[Goodhue, 1995]

➢ My workgroup feels that IS personnel can communicate with us in familiar business terms that are consistent[Goodhue, 1995]

➢ IS gives users individual attention [Pitt. et al, 1995]

➢ IS has operating hours convenient to all its users[Pitt. et al, 1995]

➢ IS has employees who give users personal attention[Pitt. et al, 1995]

➢ IS has the user's best interests at heart [Pitt. et al, 1995]

➢ Employees of IS understand the specific needs of its users[Pitt. et al, 1995]

➢ Attitude of the IS staff[Raymond, 1985]

➢ Communication with the IS staff[Raymond, 1985]

➢ Relationship with the US staff[Baroudi and Orlikowski, 1988]

➢ Attitude of the IS staff[Baroudi and Orlikowski, 1988]

➢ Communication with the IS staff Baroudi and Orlikowski, 1988]

➢ Relationship with the IS staff[Raymond,1985]

➢ Relationship with the IS staff: The manner and methods of interaction, conduct, and association between the user and the IS staff [Bailey and Pearson, 1983]

➢ Communication with the IS staff: The manner and methods of information exchange between the user and the IS staff [Bailey and Pearson, 1983]

➢ Attitude of the IS staff: The willingness and commitment of the IS staff to subjugate external, professional goals in favor of organizationally directed goals and tasks [Bailey and Pearson, 1983]

➢ IS takes my business group's business problems seriously[Goodhue, 1995]

➢ IS takes real interest in helping me solve my business problems[Goodhue, 1995]

4 Use

- *Use*

➢ To what extent do you actually use this system compared to your original expectations?[Franz and Robey, 1986]

➢ To what extent is this system actually used compared to the total number of people who potentially could be using it?[Franz and Robey, 1986]

➢ My level of the system usage is[Raymond, 1985]

5 User Satisfaction

- *Overall Satisfaction*

➢ My global satisfaction with the system is[Raymond, 1985]

➢ To what extent would you like this system to be modified or redesigned all over again from the beginning? [Franz and Robey, 1986]

➢ XX is extremely useful[Sanders, 1984]

➢ All in all I think that XX is an important system for organization[Sanders, 1984]

- *Information Satisfaction*

➢ Perceived utility: The user's judgment about the relative balance between the cost and the considered usefulness of the computer based information products or services that are provided. The costs include any costs related to providing the resource, including money, time, manpower, and opportunity. The usefulness includes any

benefits that the user believes to be derived from the support[Bailey and Pearson, 1983]

➢ Confidence in the systems: The user's feeling of assurance or certainty about the systems provided [Bailey and Pearson, 1983]

6 System/Subsystem Benefits

- *Decision Effectiveness*

  ➢ Utilization of XX has enabled me to make better decision [Sanders, 1984]

  ➢ As a result of XX, I am better able to set my priorities in decision making[Sanders, 1984]

  ➢ XX as improved the quality of decisions I make in this organization[Sanders, 1984]

  ➢ As a result of XX, the speed at which I analyze decisions has increased[Sanders, 1984]

  ➢ XX has lead me to greater use of analytical aids in my decision making[Sanders, 1984]

  ➢ As a result of XX, more relevant information has been available to me for decision [Sanders, 1984]

- *Improved Individual Productivity*

  ➢ I personally benefited from the existence of XX in this organization.[Sanders, 1984]

  ➢ I have come to rely on XX in performing my job [Sanders, 1984]

  ➢ I have become dependent on XX [Sanders, 1984]

  ➢ The company computer environment has a large, positive impact on my effectiveness and productivity in my job [Goodhue, 1995]

  ➢ IS computer systems and services are in important and valuable aid to me in the performance of my job [Goodhue, 1995]

  ➢ Using XX would enhance my effectiveness on the job [Davis, 1989]

  ➢ Using XX in my job would increase my productivity [Davis, 1989]

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➢ I would find XX useful in my job. [Davis, 1989]

• *Task Performance*

➢ To what extent does this system assist you in performing your job better? [Franz and Robey, 1986]

➢ Using XX in my job would enable me to accomplish tasks more quickly[Davis, 1989]

➢ Using XX would improve my job performance [Davis, 1989]

➢ Using XX in my job would make it easier to do my job. [Davis, 1989]

➢ Job effects: The changes in job freedom and job performance that are ascertained by the user as resulting from modifications induced by the computer-based information systems and services[Bailey and Pearson, 1983]

➢ To what extent could you get along without the use of the system?[Franz and Robey, 1986]

➢ To what extent do you understand what this system does in assisting you with your job? [Franz and Robey, 1986]

• *Individual Power or Influence*

➢ As a result of XX, I am seen as more valuable in this organization[Sanders, 1984]

➢ Use of data generated by xx has enabled me to present my arguments more convincingly [Sanders, 1984]

7 Organizational Factors

• *Top Management Support*

➢ Top management support for the system [Raymond, 1985]

➢ Top management involvement : The positive or negative degree of interest, enthusiasm, support, or participation of any management level above the user's own level toward computer based information

systems or services or toward the computer staff which supports them [Bailey and Pearson, 1983]

- *Organizational Adaptation*
  - ➢ Organizational competition with the IS unit: The contention between the respondent's organizational resources or for responsibility for success or failure of computer based information systems or services of interest to both parties [Bailey and Pearson, 1983]

- *Organizational Resources*
  - ➢ Priorities determination: Policies and procedures which establish precedence for the allocation of IS resources and services between different organizational units and their requests[Bailey and Pearson, 1983]

- *Psychological Climate*
  - ➢ Expectations: The set of attributes or features of the computer based information products or services that a user considers reasonable and due from the computer based information support rendered within this organization[Bailey and Pearson, 1983]
  - ➢ Users' understanding of systems[Baroudi and Orlikowski, 1988]
  - ➢ Understanding of systems: The degree of comprehension that a user possesses about the computer-based information or services that are provided[Bailey and Pearson, 1983]
  - ➢ Users' understanding of system[Raymond, 1985]
  - ➢ Users' feeling of participation[Baroudi and Orlikowski, 1988]
  - ➢ Feeling of participation: The degree of involvement and commitment which the user shares with EDP staff and others toward the functioning of the computer-based information systems and services[Bailey and Pearson, 1983]

➢ Users' feeling of participation[Raymond, 1985]

➢ Feeling of control: The users' awareness of the personal power or lack of power to regulate, direct or dominate the development, alteration, and/or the execution of the computer-based information systems or services which serve the user's perceived function[Bailey and Pearson, 1983]

- *Human Resources*

➢ Degree of training: The amount of specialized instruction and practice that is afforded to the user to increase the user's proficiency in utilizing the computer capability that is unavailable[Bailey and Pearson, 1983]

➢ There is not enough training for me or my staff on how to find, understand, access or use the company computer systems[Goodhue, 1995]

➢ I am getting the training I need to be able to use company computer systems, languages, procedures and data effectively[Goodhue, 1995]

➢ Degree of IS training provided to users [Baroudi and Orlikowski, 1988]

➢ Degree of IS training provided to users[Raymond, 1985]

- **IS Management**

➢ Organizational position of the IS function: The hierarchical relationship of the IS function to the overall organizational structure)[Bailey and Pearson, 1983]

B. Interview Form

GÖRÜŞME FORMU

SORU NO: 1	KATEGORİ: SİSTEM NİTELİĞİ	KRİTER: KULLANIM KOLAYLIĞI
Bilgi sisteminin kullanımını kolay buluyor musunuz? Eğer cevabınız kısmen evet veya hayır ise bu sistemi kullanırken karşılaştığınız zorlukları tanımlayabilir misiniz?		
[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR
NOT:		

SORU NO: 2	KATEGORİ: SİSTEM NİTELİĞİ	KRİTER: ÖĞRENME KOLAYLIĞI
Bilgi sisteminin öğrenilmesini kolay buluyor musunuz? Eğer cevabınız kısmen evet veya hayır ise öğrenmede ne gibi zorluklarla karşılaştığınızı tanımlayabilir misiniz?		
[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR
NOT:		

SORU NO: 3	KATEGORİ: SİSTEM NİTELİĞİ	KRİTER: ERİŞİM KOLAYLIĞI
Bilgi sisteminin görevinizle ilgili işlevlerini kullanabilmek için istediğiniz seviyede yetkilendirmeye sahip misiniz? Eğer cevabınız kısmen evet veya hayır ise size yetki verilmeyen hangi özelliklerin de sizin tarafınızdan kullanılmasını istediğinizi sebep belirterek tanımlayabilir misiniz?		
[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR
NOT:		

SORU NO: 4	KATEGORİ: SİSTEM NİTELİĞİ		KRİTER: ERİŞİM KOLAYLIĞI
Bilgi sisteminin ihtiyaç duyduğunuz özelliklerini kullanmak için yetkilendirme alma sürecinden memnun musunuz? Eğer cevabınız kısmen evet veya hayır ise yetki alırken ne tür zorluklarla karşılaşıyorsunuz?			
[ ] EVET	[ ] KISMEN EVET		[ ] HAYIR
NOT:			

SORU NO: 5	KATEGORİ: SİSTEM NİTELİĞİ		KRİTER: SİSTEM DOĞRULUĞU
Bilgi sisteminin doğru olarak işlediğini düşünüyor musunuz? Eğer cevabınız kısmen evet veya hayır ise bu sistemin size göre doğru çalışmayan/hatalı olan bölümlerini tanımlayabilir misiniz?			
[ ] EVET	[ ] KISMEN EVET		[ ] HAYIR
NOT:			

SORU NO: 6	KATEGORİ: SİSTEM NİTELİĞİ		KRİTER: SİSTEM DOĞRULUĞU
Bilgi sisteminin herhangi bir bölümüne hatalı bilgi girilmesi veya sistemin hatalı bir bilgi üretmesi durumunda bu hataların düzeltilme süreçleri istediğiniz seviyede mi?(yöntem, hız ve yeterlilik) Eğer cevabınız kısmen evet veya hayır ise hata düzeltme sürecinin yöntemi, hızı ve yeterliliği bakımından problemlerinizi tanımlayabilir misiniz?			
[ ] EVET	[ ] KISMEN EVET		[ ] HAYIR
NOT:			

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SORU NO: 7	KATEGORİ: SİSTEM NİTELİĞİ		KRİTER: SİSTEM ESNEKLİĞİ
Bilgi sistemini yeni ihtiyaçlardan doğan değişiklik veya ek işlev isteklerini karşılayabilmesi bakımından yeteri kadar esnek buluyor musunuz? Eğer cevabınız kısmen evet veya hayır ise problemleri tanımlayabilir misiniz?			
[ ] EVET	*[ ] KISMEN EVET*		*[ ] HAYIR*
___NOT:___			

SORU NO: 8	KATEGORİ: SİSTEM NİTELİĞİ		KRİTER: SİSTEM GÜVENİLİRLİĞİ
Sisteme ihtiyaç duyduğunuzda her an çalışır durumda mıdır? Eğer cevabınız kısmen evet veya hayır ise problemleri tanımlayarak (arıza veya sistem çökmesi gibi) bu durumların hangi sıklıkla yaşandığını tanımlayabilir misiniz?			
[ ] EVET	*[ ] KISMEN EVET*		*[ ] HAYIR*
___NOT:___			

SORU NO: 9	KATEGORİ: SİSTEM NİTELİĞİ		KRİTER: SİSTEM GÜVENİLİRLİĞİ
Bilgi sistemi, yetkisi olmayan kullanıcılar tarafından bilgilerin değiştirilmesini veya yok edilmesini engelleyerek sistemin güvenliğini sağlıyor mu? Eğer cevabınız kısmen evet veya hayır ise güvenlikle ilgili problemlerinizi tanımlayabilir misiniz?			
[ ] EVET	*[ ] KISMEN EVET*		*[ ] HAYIR*
___NOT:___			

SORU NO:	KATEGORİ:	KRİTER:
10	SİSTEM NİTELİĞİ	SİSTEM ENTEGRASYONU

Bilgi sistemi, farklı fonksiyonel alanlardaki bilgileri diğer alt sistemlerden alarak kullanabiliyor mu? Eğer cevabınız kısmen evet veya hayır ise hangi alt sistemler arasında bilgi alışverişini gerekli gördüğünüzü tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
11	SİSTEM NİTELİĞİ	SİSTEM ENTEGRASYONU

Farklı alt sistemlerden aldığınız aynı içerikteki veriler/bilgiler birbiri ile uyumlu mu? Eğer cevabınız kısmen evet veya hayır ise aynı olması gereken hangi verilerin/bilgilerin farklı olduğunu tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
12	SİSTEM NİTELİĞİ	SİSTEM HIZI

Bilgi sisteminin çalışma hızı ihtiyacınıza cevap veriyor mu? Eğer cevabınız kısmen evet veya hayır ise çalışma hızı konusundaki problemlerinizi tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO: 13	KATEGORİ: BİLGİ NİTELİĞİ	KRİTER: BİLGİ GEREKLİLİĞİ

Bilgi sisteminin ürettiği bilgiler/raporlar görevinizle ilişkili midir? Eğer cevabınız kısmen evet veya hayır ise hangi bilgilerin/raporların sizin işiniz için gereksiz olduğunu düşünüyorsunuz?

[ ] EVET	*[ ] KISMEN EVET*	*[ ] HAYIR*

NOT:

SORU NO: 14	KATEGORİ: BİLGİ NİTELİĞİ	KRİTER: BİLGİ GEREKLİLİĞİ

Bilgi sistemin ürettiği bilgilerin/raporların sizin görevinizi yapmanız için istediğiniz seviyede işe yarar bilgiler olduğunu düşünüyor musunuz? Eğer cevabınız kısmen evet veya hayır ise bu bilgi sistemi bazında hangi bilgilere de ihtiyaç duyduğunuzu tanımlayabilir misiniz?

[ ] EVET	*[ ] KISMEN EVET*	*[ ] HAYIR*

NOT:

SORU NO: 15	KATEGORİ: BİLGİ NİTELİĞİ	KRİTER: BİLGİ AÇIKLIĞI(ANLAŞILIRLIK)

Bilgi sisteminin ürettiği bilgileri/raporları anlaşılır ve açık buluyor musunuz? Cevabınız kısmen evet veya hayır ise hangi bilgilerin açık olmadığını tanımlayabilir misiniz?

[ ] EVET	*[ ] KISMEN EVET*	*[ ] HAYIR*

NOT:

SORU NO:	KATEGORİ:	KRİTER:
16	BİLGİ NİTELİĞİ	RAPOR BİÇİMİ

Bilgi sisteminin ürettiği raporları biçim olarak ihtiyaçlarınıza uygun buluyor musunuz? Eğer cevabınız kısmen evet veya hayır ise hangi raporları ne şekilde düzenliyorsunuz? (bazı raporların tekrar kelime işlem veya hesap tablosu programlarında düzenlenmesi gibi)

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
17	BİLGİ NİTELİĞİ	BİLGİ DOĞRULUĞU

Bilgi sistemin ürettiği bilgiler daima doğru mudur? Eğer cevabınız kısmen evet veya hayır ise hangi bilgilerin sistem tarafından hatalı olarak üretildiğini tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
18	BİLGİ NİTELİĞİ	BİLGİ DETAYI

Bilgi sisteminin ürettiği bilgiler sizin istediğiniz hassasiyette/kesinlikte midir? Eğer cevabınız kısmen evet veya hayır ise hangi bilgilerin hangi seviyede detayla üretilmesini gerektiğini tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO: 19	KATEGORİ: BİLGİ NİTELİĞİ	KRİTER: BİLGİ GÜVENİLİRLİĞİ

Bilgi sisteminin ürettiği bilgiler ve raporlar güvenilir mi? Eğer cevabınız kısmen evet veya hayır ise bilgilerin/raporların güvenilirliği konusundaki problemleri tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO: 20	KATEGORİ: BİLGİ NİTELİĞİ	KRİTER: BİLGİ GÜNCELLİĞİ

Bilgi sisteminden aldığınız bilgiler/raporlar ihtiyacınızı karşılayacak şekilde güncel mi? Eğer cevabınız kısmen evet veya hayır ise hangi tür bilgilerde/raporlarda güncellik problemleri olduğunu tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO: 21	KATEGORİ: BİLGİ NİTELİĞİ	KRİTER: BİLGİ ZAMANLILIĞI

Bilgi sisteminin sunduğu zamanlanmış bilgiler zamanında mı hazırlanıyor? Eğer cevabınız kısmen evet veya hayır ise hangi tür bilgilerin/raporların zamanlama problemi olduğunu tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
22	SERVİS NİTELİĞİ	DONANIM/YAZILIM

Bilgi sistemi sizce güncel yazılım ve donanıma sahip mi? Eğer cevabınız kısmen evet veya hayır ise güncel olmadığın düşündüğünüz bileşenler sebebiyle yaşadığınız problemleri tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
23	SERVİS NİTELİĞİ	OBS Ş. HİZMETLERİ

Bilgi sistem şubesinin sağladığı hizmetlerden memnun musunuz? Eğer cevabınız kısmen evet veya hayır ise hangi konulardaki hizmetlerin geliştirilmesini isterdiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
24	SERVİS NİTELİĞİ	OBS Ş. HİZMETLERİ

Bilgi sistemi şubesi herhangi bir konuda taahhütte bulunursa zamanında yerine getirir mi? Eğer cevabınız kısmen evet veya hayır ise yaşadığınız problemleri tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
25	SERVİS NİTELİĞİ	OBS Ş.'NİN İLGİSİ

Bilgi sistemi şubesi, kullanıcılar herhangi bir problemle karşılaştıklarında çözmek için ilgi gösterirler mi? Eğer cevabınız kısmen evet veya hayır ise yaşadığınız problemleri tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
26	SERVİS NİTELİĞİ	OBS Ş. HİZMETLERİNİN BİLDİRİLMESİ

Bilgi sistemi şubesi, sağlayacağı hizmetlerin(bakım zamanları dahil) kesin zamanını daha önceden size bildirir mi? Eğer cevabınız kısmen evet veya hayır ise yaşadığınız problemleri tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
27	SERVİS NİTELİĞİ	SİSTEM DEĞİŞİKLİK İSTEKLERİ

Bilgi sistemi şubesinin hali hazırda kullanılmakta olan bilgi sistemindeki değişiklik isteklerini yerine getirme sürecinden memnun musunuz? Eğer cevabınız kısmen evet veya hayır ise sürecin problemli taraflarını tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO: 28	KATEGORİ: SERVİS NİTELİĞİ	KRİTER: OBS Ş. PERSONELİNİN TEKNİK YETERLİLİĞİ

Bilgi sistemi şubesi personelini problemlerinizi çözebilecek teknik bilgiye sahip olduğunu düşünüyor musunuz? Eğer cevabınız kısmen evet veya hayır ise yaşadığınız problemleri tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO: 29	KATEGORİ: SERVİS NİTELİĞİ	KRİTER: OBS Ş. NİN MESAİ SAATLERİ

Bilgi sistemi şubesinin çalışma saatleri sizin çalışma saatlerinizle uyumlu mu ? Eğer cevabınız kısmen evet veya hayır ise yaşadığınız problemleri tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO: 30	KATEGORİ: SERVİS NİTELİĞİ	KRİTER: OBS Ş. İLE İLETİŞİM

Bilgi sistemi şubesi personeline iş süreçlerine ilişkin ihtiyaçlarınızı anlatabiliyor musunuz? Eğer cevabınız kısmen evet veya hayır ise iletişimde yaşadığınız problemleri tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
31	SİSTEM KULLANIMI	SİSTEM KULLANIMI

Bilgi sistemini beklentileriniz düzeyinde kullanabiliyor musunuz? Eğer cevabınız kısmen evet veya hayır ise sistemin hangi bölümlerini kullanmadığınız/kullanamadığınızı ve ne maksatla kullanmanız gerektiğini açıklayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
32	SİSTEM KULLANIMI	SİSTEM KULLANIMI

Sizce bilgi sistemini potansiyel olarak kullanması gereken herkes kullanmakta mıdır? Eğer cevabınız kısmen evet veya hayır ise bilgi sisteminin kimler tarafından da kullanılabileceğini düşünüyorsunuz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
33	KULLANICI TATMİNİ	GENEL TATMİN

Bilgi sisteminden genel olarak memnun musunuz? Eğer cevabınız kısmen evet veya hayır ise bilgi sisteminin hangi bölümlerinin düzeltilmesini veya yeni baştan dizayn edilmesini isterdiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
34	*KULLANICI TATMİNİ*	*GENEL TATMİN*

Bilgi sistemini organizasyonunuz ve biriminiz için yararlı buluyor musunuz? Eğer cevabınız kısmen evet veya hayır ise memnun olmadığınız kısımları tanımlayabilir misiniz? (Kullanıcının işe yararlık kavramını düşünüp düşünmediği anlaşılmaya çalışılacak)

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
35	*KULLANICI TATMİNİ*	*GENEL TATMİN*

Bilgi sistemine yapılan yatırımı (para, zaman, insan gücü) sistemin işe yararlılığı ile karşılaştırdığınızda rasyonel buluyor musunuz? Eğer cevabınız kısmen evet veya hayır ise problemleri tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
36	*SİSTEM FAYDALARI*	*KARAR ETKİLİLİĞİ*

Bilgi sisteminin karar verme süreçlerinize hız ve nitelik bakımından olumlu katkıda bulunduğunu söyleyebilir misiniz? Eğer cevabınız kısmen evet veya hayır ise bilgi sisteminin hangi bilgileri de karar verme süreçleriniz için üretmesini isterdiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO: 37	KATEGORİ: SİSTEM FAYDALARI	KRİTER: KİŞİSEL KATKI

Bilgi sisteminin kişisel verimliliğinizi arttırdığınızı söyleyebilir misiniz? Eğer cevabınız kısmen evet veya hayır ise sizin performansınıza bilgi sisteminin nasıl daha fazla katkıda bulunabileceğini ve düşünüyorsunuz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO: 38	KATEGORİ: SİSTEM FAYDALARI	KRİTER: İŞ VERİMLİLİĞİ

Bilgi sistemi hız ve nitelik bakımından iş performansınızı arttırdı mı? Eğer cevabınız kısmen evet veya hayır ise ne gibi değişikliklerle sistemin iş performansınıza etkisinin daha fazla olacağını değerlendiriyorsunuz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO: 39	KATEGORİ: SİSTEM FAYDALARI	KRİTER: SİSTEME BAĞIMLILIK

Bilgi sistemine iş yapma yöntemleri bakımından bağımlı mısınız? Eğer cevabınız kısmen evet veya hayır ise işlerinizi başka hangi şekilde yapıyorsunuz? (Kullanılan bilgi sistemi dışında aynı anda devam ettirilen başka bir sistemin olup olmadığını ortaya çıkarmak)

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
40	SİSTEM FAYDALARI	KİŞİSEL DEĞERE KATKISI

Bilgi sistemini kullanmanın iş ortamında değerinizi arttırdığını düşünüyor musunuz? Eğer cevabınız kısmen evet veya hayır ise gerekçelerinizi tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
41	ÖRGÜTSEL FAKTÖRLER	YÖNETİM DESTEĞİ

Bilgi sistemi üst seviye yöneticiler tarafından destekleniyor mu? Eğer cevabınız kısmen evet veya hayır ise hangi konularda üst kademe yöneticilerin desteğinin gerektiğini düşünüyorsunuz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
42	ÖRGÜTSEL FAKTÖRLER	ÖRGÜT İÇİ DESTEK

Organizasyon içinde bilgi sistemine genel olarak yaklaşım destekleyici ve olumlu mudur? Eğer cevabınız kısmen evet veya hayır ise hangi konularda problemler yaşadığınızı söyleyebilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO: 43	KATEGORİ: ÖRGÜTSEL FAKTÖRLER	KRİTER: ÖRGÜTÜN SİSTEM HAKKINDAKİ BİLGİSİ

Bilgi sistemi kullanıcılarının sistem ve verilen hizmetler hakkındaki bilgileri yeterli midir? Eğer cevabınız kısmen evet veya hayır ise kullanıcıların bilgi eksiği olduğu konuları ve bunun sistemin başarısına olan etkilerini tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO: 44	KATEGORİ: ÖRGÜTSEL FAKTÖRLER	KRİTER: SÜREÇLERE KATILIM

Bilgi sistemi kullanıcıları sistemin oluşturulmasında, yönetilmesinde ve sistem hakkındaki değişiklik isteklerinin icra edilmesinde fikir boyutunda ve fiili olarak katılımcı olduklarını düşünüyor musunuz? Eğer cevabınız kısmen evet veya hayır ise hangi konularda kullanıcıların da görüşlerinin alınmasını ve fiili olarak katılımlarının olmasını gerektiğini tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO: 45	KATEGORİ: ÖRGÜTSEL FAKTÖRLER	KRİTER: ÖRGÜT KAYNAKLARININ TAHSİSİ

Organizasyonda bilgi sistem şubesine ayrılan kaynaklar yeterli midir? Eğer cevabınız kısmen evet veya hayır ise bilgi sistem şubesinin problemlerini ayrılan kaynaklar bakımından tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
46	ÖRGÜTSEL FAKTÖRLER	SİSTEMDEN BEKLENTİLER

Organizasyon içinde bilgi sisteminden beklentiler gerçekçi midir? Eğer cevabınız kısmen evet veya hayır ise beklentileri tanımlayabilir misiniz? (olumlu/olumsuz, yüksek/düşük, net/net olmayan, iyimser/kötümser)

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
47	ÖRGÜTSEL FAKTÖRLER	EĞİTİM

Bilgi sisteminin kullanımı için yeteri derecede eğitim veriliyor mu? Eğer cevabınız kısmen evet veya hayır ise hangi konularda,kimlere, nasıl eğitim verilmesi gerektiğini düşünüyorsunuz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT:

SORU NO:	KATEGORİ:	KRİTER:
48	ÖRGÜTSEL FAKTÖRLER	OBS Ş.'NİN ÖRGÜTTEKİ KONUMU/YÖNETİMİ

Bilgi sistemi şubesinin organizasyon hiyerarşisindeki yeri istenilen konumda mıdır? Eğer cevabınız kısmen evet veya hayır ise bu konumda olmasının yarattığı problemleri tanımlayabilir misiniz?

[ ] EVET	[ ] KISMEN EVET	[ ] HAYIR

NOT: