TOWARD AN UNDERSTANDING OF ACCEPTANCE OF ELECTRONIC PERFORMANCE SUPPORT SYSTEMS: WHAT DRIVES USERS' PERCEPTIONS REGARDING USEFULNESS AND EASE OF USE?

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ABSTRACT

TOWARD AN UNDERSTANDING OF ACCEPTANCE OF ELECTRONIC PERFORMANCE SUPPORT SYSTEMS: WHAT DRIVES USERS' PERCEPTIONS REGARDING USEFULNESS AND EASE OF USE?

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This study aimed to explain and understand the acceptance of the Electronic Performance Support System (EPSS) on the basis of the Technology Acceptance Model (TAM). This mixed methods research study was conducted within the Crime Scene Investigation and Identification Units of the Turkish National Police. The quantitative data were collected from 209 police officers with a questionnaire to test the hypothesized relationships in TAM. At the same time, the qualitative data were collected through interviews with 15 police officers to acquire an in-depth understanding of the key beliefs (perceived usefulness and perceived ease of use) and facilitating conditions regarding the acceptance of the EPSS. Analysis of the quantitative data using Structural Equation Modeling showed that perceived usefulness, perceived ease of use, and attitude toward using the EPSS play important roles in the acceptance of the EPSS. Moreover, the content analysis of the interviews revealed that the EPSS was perceived as useful due to access to information, saving on time, performing tasks more accurately, reducing variability in work, making jobs easier, and other benefits. In addition, the results indicated that there were a variety of user personal, system, and organizational characteristics that influenced the

perceived usefulness and perceived ease of use of the EPSS. Finally, the findings showed that support, environmental, organizational, and other conditions (e.g., experience and advantages) would facilitate the acceptance of the EPSS.

Keywords: Electronic Performance Support System, Technology Acceptance Model

ÖZ

ELEKTRONİK PERFORMANS DESTEK SİSTEMLERİNİN KABULÜNÜ ANLAMAYA DOĞRU: KULLANICILARIN KULLANIŞLILIK VE KULLANIM KOLAYLIĞINA İLİŞKİN ALGILARINI BELİRLEYEN UNSURLAR NELERDİR?

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Bu çalışma Teknoloji Kabul Modeline (TKM) dayanarak Elektronik Performans Destek Sisteminin (EPDS) kabulünü açıklamayı ve anlamayı amaçlamaktadır. Bu karma araştırma yöntemi çalışması Türk Polis Teşkilatının Olay Yeri İnceleme ve Kimlik Tespit Birimleri bünyesinde gerçekleştirilmiştir. TKM tarafından ortaya konulan önermeleri kontrol etmek için, nicel veriler 209 polis memurundan anket ile toplanmıştır. Aynı zamanda, EPDS'nin kabulüne ilişkin anahtar inanışları (algılanan kullanışlılık ve algılanan kullanım kolaylığı) ve kolaylaştırıcı koşulları derinlemesine anlamayı sağlamak için, nicel veriler 15 polis memuru ile görüşmeler yoluyla toplanmıştır. Yapısal Eşitlik Modelinin kullanıldığı nicel verilerin analizi algılanan kullanışlılığın, algılanan kullanım kolaylığı ve kullanıma yönelik tutumun EPDS'nin kabulünde önemli rol oynadığını göstermiştir. Ayrıca, görüşmelerin içerik analizi EPDS'nin bilgiye ulaşım, zamandan tasarruf, işleri daha doğru şekilde yapılması, işteki değişkenliğin azalması, işin daha kolay olması ve diğer yararlarından dolayı kullanışlı olarak algılandığını ortaya koymuştur. Bununla birlikte, sonuçlar EPDS'nin algılanan kullanışlılığını ve algılanan kullanım kolaylığını etkileyen çeşitli kullanıcı, sistem ve kurumsal özelliklerin olduğunu göstermiştir. Son olarak, bulgular destek, çevresel,

kurumsal ve diğer (örneğin, deneyim ve avantajlar) koşulların EPDS'nin kabulünü kolaylaştıracağını göstermiştir.

Anahtar Kelimeler: Elektronik Performans Destek Sistemi, Teknoloji Kabul Modeli

To my lovely daughter

and

my wife

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CHAPTER I

INTRODUCTION

This chapter presents the rationale underlying the study. It consists of background of the problem, statement of the problem, purpose of the study, significance of the study, and the research questions and hypotheses. It also defines the terms used in the study.

1.1. Background of the Problem

Is training always a primary approach to address performance problems or opportunities in workplaces? In most cases, when instructional designers are faced with performance problems in workplaces, they consider a well-designed training program as the best solution, regardless of the causes of the problems. Training programs help employees to acquire new knowledge, skills, and attitude required for a successful job performance (Buckley & Caple, 2009; Rothwell, 2008). These programs (traditional or computer-based) consist of structured activities which require employees to stop working, learn new knowledge and skills, and then transfer what they have learned into their specific work situations. From this point of view, learning is a precondition for job performance.

Although well-designed training programs are more likely to result in better learning, they do not necessarily lead to successful job performance in workplaces (Rosenberg, 1995). In training programs, a delay between learning and performance causes employees to forget what they have learned before applying it (McKay & Wager, 2007; Puterbaugh, Rosenberg, & Sofman, 1989). As cited by Nguyen (2009), Rackham (1979) found that people can forget 87% of what they learned in training when they are not supported by any additional interventions. Moreover, employees usually have difficulty in transferring what they have learned successfully into actual job situations (Baldwin & Ford, 1988; Hodges, 2002). In addition, Raybould (1995) claims that employees learn only 10-15% of job knowledge in formal training programs; they learn 85-90% on the job. Furthermore, training is not an efficient way

to satisfy performance needs of rapidly changing workplace conditions in a constant manner (McKay & Wager, 2007). Also, employees take time away from their job to participate training programs, causing the loss of productivity (Stolovitch & Keeps, 1999). In consequence, instructional designers have recognized that training may not an effective and efficient solution to performance problems in many cases, and so they need to look beyond training.

Especially due to the increased prevalence and the capabilities of computers in workplaces, instructional designers have regarded Electronic Performance Support System (EPSS) solutions as viable means of addressing performance problems and opportunities in workplaces. EPSSs are used to provide access to a variety of resources and tools for employees to perform job-related tasks effectively and efficiently (Gery, 1991; McKay & Wager, 2007). EPSS interventions can respond to performance problems or opportunities in workplaces by means of integrated and on-demand access to (a) performance support tools, (b) reference, (c) instruction, and (d) collaboration components (Gery, 2002).

Performance support systems primarily place emphasis on supporting performance rather than learning. In contrast to training programs, learning is an incidental outcome of performance (Hannafin, Hill, & McCarthy, 2000). By providing tools and resources, an EPSS helps employees to understand concepts and organize knowledge. This system enables employees to learn while they are doing their work. In this respect, Gustafson (2000) noted that performance support systems do not only overcome the major limitations of training (i.e., forgetting, transfer of training on the job, and changing demands of workplace conditions) but also reduce or eliminate the amount of training which is needed to address performance problems in workplaces. As a result, instructional designers have shifted their focus toward EPSSs to deal with performance problems and opportunities in workplaces (Gery, 1991; Rosenberg, 1995).

The design and development process of an EPSS play a critical role in its success. For successful task performance in a workplace, designers need to design and develop an EPSS appropriately (Milhelm, 1997). According to Barker and Banerji (1995), a successful EPSS design requires identification of performance problems

and development of appropriate support systems for performance improvement. Effective design and development activities are a necessary condition for a successful EPSS, but they are not sufficient.

Successful implementation is also a necessary condition for an effective EPSS. Any performance improvement intervention must be implemented successfully in order to attain desired and anticipated results (Van Tiem, Moseley, & Dessinger, 2004; Watkins, 2007). Poorly implemented performance interventions are unlikely to make anticipated changes in individuals and organizations. Similarly, performance support systems accomplish intended performance goals if they are used sufficiently in organizations (Carliner, 2002). It is important to ensure successful implementation for the success of an EPSS.

According to innovation-decision process (Rogers, 2003), implementation occurs after individuals decide to use an innovation. Therefore, it can be argued that user adoption is a necessary condition for a successful EPSS implementation. Lack of individual acceptance probably causes performance support systems not to be fully utilized. Even in mandatory use context, individuals can impede implementation of an EPSS because when individuals do not wholeheartedly accept an innovation, they can delay, underutilize, or sabotage it (Leonard-Barton, 1988; Markus, 1983). Consequently, an adoption decision is a critical step toward a successful EPSS implementation.

In order to ensure performance improvement in a workplace, an EPSS should be designed for acceptance (Carliner, 2002; van Schaik, 2010). No matter how well an EPSS is designed and developed, any improvement in performance does not occur when people do not decide to make full use of it. In general, if people reject to use any performance improvement intervention, it has no value for the organization (Spitzer, 1999; Stolovitch & Keeps, 2004). Gerson (2006) also notes that "no matter what you do, no matter what intervention you select, no matter how well you implement it, it will not work effectively if the performer simply does not want to perform" (p. 12). Performance improvement interventions are effective only if they are adopted. Similarly, an EPSS is unlikely to enhance task performance if people do not accept to use it on the job. Therefore, it can be argued that user acceptance is a

pivotal factor for the success of an EPSS in enhancing performance in an organization.

Even if an EPSS is effectively designed and developed to improve users' performance, it is not always readily accepted. The studies has advanced a variety of social, administrative, economic, political, technical, and user-related factors that have an impact on users' decisions on acceptance of EPSSs (Carliner, 2002; Gery, 1991; Nguyen, 2010; 2012; Nguyen & Woll, 2006; Rosset, 1996). In order to encourage a greater acceptance and effective utilization, designers must employ a number of techniques to address these issues in the design and implementation phases of performance support systems.

In this respect, designers need to have a better understanding of why people use EPSSs and, more importantly, why people do not. The efforts to explain the acceptability of a system and understand factors affecting adoption allow designers to take appropriate interventions or strategies that lead to greater system acceptance and use (Davis, 1993; Venkatesh & Bala, 2008). Otherwise, designers are not able to overcome user resistance to system use. Consequently, understanding what influences user acceptance of EPSSs helps designers to determine how to manipulate design and implementation process in order to foster acceptance or minimize rejection of an EPSS. In this way, designers can create an ideal environment which enhances adoption of performance support systems.

In summary, due to growing importance of performance support systems in solving performance problems or realizing performance opportunities in organizations, the following questions deserve a substantial consideration for a successful EPSS: what influences users' behavioral intention to use an EPSS? What contributes to users' decisions to make use of an EPSS? How could acceptance of an EPSS be enhanced in a workplace?

1.2. Statement of the Problem

Performance support systems have emerged as one of the most viable and effective ways of addressing performance problems or opportunities in work environments (Gery, 1991; Rosenberg, 1995). To mitigate performance problems in a workplace,

EPSSs can provide people with whatever they need to perform the tasks effectively (McKay & Wager, 2007; Nguyen, 2010). These systems enable people to perform tasks better in less time, with fewer errors, with more accuracy, or with little to no training (Nguyen & Klein, 2008). However, despite the potential of a well-designed EPSS in improving job performance, it is not always readily accepted.

Analyzing performance problems and designing task supports are necessary but not sufficient conditions for a successful EPSS implementation (van Schaik, 2010). An EPSS should be designed for user acceptance. In general, although designers focus almost entirely on the attributes of performance improvement interventions, they mainly ignore the human aspects (Spitzer, 1999). However, it is important to consider what people bring to a situation. Any performance improvement intervention will fail if people do not actually use it. Similarly, if people do not sufficiently adopt an EPSS, it is not likely to accomplish intended performance goals (Carliner, 2002; van Schaik, 2010). Lack of user acceptance impedes the success of an EPSS. Adoption is critical to obtain the anticipated consequences of EPSS implementation. Therefore, it is important to understand why people decide to adopt or reject an EPSS in order to reduce or avoid the risk of delivering the system which people are likely to reject.

Although user acceptance is an important factor influencing the success or failure of an EPSS, minimal research attention has been directed toward understanding this issue. There is a need to determine what influences users' decisions about EPSS acceptance in organizations.

1.3. Purpose of the Study

Lack of user acceptance is a critical barrier for successful implementation of performance support systems in organizations. An EPSS is likely to fail to support job performance when people do not use it. Therefore, understanding of user acceptance of performance support systems is at the core of the present research.

Acceptance theories are one of the important domains of EPSS (Bayram, 2004). The Technology Acceptance Model (TAM) (Davis, Bagozzi, & Warshaw, 1989) is recommended as a framework to investigate user acceptance of an EPSS (Barker,

2010b). TAM is a valid, powerful, robust, and parsimonious model which explains user acceptance of information systems (Taylor & Todd, 1995a; Venkatesh, 2000). It suggests that intention to use a system determines users' actual system use. According to this model, perceived usefulness and perceived ease of use are two specific beliefs which affect a person's intention to use an information system through their impact on his or her attitude toward using it. Based on TAM, the intent of this study is to explain user acceptance of the EPSS by examining relationships among perceived usefulness, perceived ease of use, attitude toward using it, and intention to use it.

TAM posits perceived usefulness and perceived ease of use as two fundamental and distinct beliefs which influence users' decisions to use an information system (Davis, 1989; Davis et al., 1989). These beliefs influence users' attitudes toward using an information system and their usage intention. The determinants of perceived usefulness and perceived ease of use allow designers to formulate strategies that result in greater acceptance and more effective utilization of information technologies (Davis, 1993; Davis, et al., 1989; Venkatesh & Bala, 2008). Similarly, a better understanding of users' perceptions related to the usefulness and ease of use of the EPSS offers valuable information on where designers should invest their efforts to enhance user acceptance and usage. Therefore, the current study aims to provide insights on users' perceptions regarding the usefulness and ease of use of the EPSS, and to explore how to facilitate user acceptance of the EPSS.

1.4. Significance of the Study

This study makes significant contributions to the literature on EPSS and technology acceptance in many respects. Firstly, an important contribution of the study is to present the nature of user acceptance of the EPSS in the organization. User acceptance plays an important role in the success of an EPSS (Carliner, 2002; van Schaik, 2010). A well-designed EPSS probably becomes a poor performance solution due to users' resistance. In fact, an EPSS can lead to undesirable results in an organization if users reject or resist using such system. In such situations, time, money, and resources invested during the design and development of an EPSS get wasted. Therefore, explaining and understanding of user acceptance of the EPSS

provide a great value for practitioners. The findings of this study help to acquire an understanding of how to design and implement an EPSS in order to ensure its adoptions in an organization.

Secondly, this study also allows exploring the factors that drive individuals' decision to adopt the EPSS. It is unlikely that individuals readily adopt or use an EPSS after successful design and development efforts (Carliner, 2002; Stone & Villachica, 2003). According to TAM, perceived usefulness and perceived ease of use are two beliefs which play important roles in the decision of whether an individual adopt or not an information system. Therefore, understanding of the antecedents of perceived usefulness and perceived ease of use enables designers or administrators to identify why resistance is likely to occur. Thus, designers devise possible interventions that influence these beliefs and, through them, use of performance support systems. In this respect, this study holds a great practical value in terms of user acceptance of an EPSS in a work environment. In other words, the study helps designers understand acceptance of the EPSS in order to design interventions in a meaningful way. Therefore, this study has important implications for practice.

Thirdly, this study is expected to lay groundwork for further studies focused on adoption of an EPSS in different contexts. In spite of the importance of user acceptance in the success of EPSSs, there are few studies that investigate adoption, diffusion, and implementation of such systems.

Fourthly, this study draws on TAM as a theoretical model to investigate user adoption of the EPSS. TAM offers a powerful, robust, and parsimonious theoretical model to address user acceptance and use of information technologies in several contexts (Taylor & Todd, 1995a; Venkatesh, 2000). According to Venkatesh, Morris, Davis, and Davis (2003), TAM has generalizability across time and populations. In addition, it has contextual and predictive validity for technology use. When compared to other models of technology adoption and use, TAM and its extensions are more favorable to explaining intentions for using a system (Venkatesh, Davis, & Morris, 2007). Therefore, TAM provides a strong foundation to study user adoption of the EPSS.

Fifthly, the research context of the study has distinctive value with respect to the user group and the information system used in the study. Previous TAM studies mainly involved students in university environments (Lee, Kozar, &Larsen, 2003; Legris, Ingham, & Collerette, 2003). According to Yousafzai, Foxall, and Pallister (2007a), however, students are not representative of employees in terms of age, experience with the technology, income, and motivations for using the technology, so the findings are limited to represent the real work environments. In contrast, the findings of this study are based on the data collected from the police officers in the Crime Scene Investigation and Identification Units of the Turkish National Police. This research investigates acceptance of the EPSS that the police officers use when performing tasks related to crime scene investigation and identification. Moreover, there is a difference in the explanatory power of TAM between students in a university laboratory environment and subjects in real working environments (Sun & Zhang, 2006). Therefore, the findings of the study represent users in performing job-related tasks in the actual work setting. In addition, TAM is not widely applied to investigate acceptance of performance support systems. According to Lee et al. (2003), studies on different information systems and environments are needed. The findings of TAM relationships show a wide variation of predicted effects with different types of users and technology (Yousafzai et al., 2007a). In this regard, this study has extended applications whose acceptance is examined with the use of TAM.

Lastly, this study provides a broad and deep understanding of individual acceptance of the EPSS by using both quantitative and qualitative methods. Previous TAM studies overwhelmingly are based on quantitative methodologies, particularly questionnaire-based survey methods (Lee et al., 2003). Although these studies contributed well to our understanding of the acceptance of information technologies, they did not provide a deep understanding, especially about the key determinants of technology acceptance (Benbasat & Barki, 2007; Chuttur, 2009). They provided limited explanations of acceptance. Moreover, according to Wu (2011), survey based TAM studies have problems that result from biases, data reduction, and difficulty in ad-hoc changes. Therefore, it is suggested to incorporate qualitative methods into studies to get a rich description of the phenomena under investigation (Lee et al., 2003; Wu, 2011). In this study, the quantitative method tested the relationships

between the variables proposed by TAM, while the qualitative method explored the factors contributing to the usefulness and perceived ease of use of the EPSS, and those facilitating the acceptance of the EPSS. This approach provides a more holistic picture of factors critical to understand user acceptance of the EPSS, rather than a selective description of them. As stated by Wu (2011), the evaluation of TAM constructs with a mixed methods approach provides a deep understanding of technology acceptance. This methodological perspective also addresses challenges in choosing the right external variables for a specific information technology or environment.

1.5. Research Questions and Hypotheses

In an effort to shed light on the acceptance of the EPSS designed for the police officers in the Crime Scene Investigation and Identification Unit of the Turkish National Police, this mixed methods research study aims to answer to the following main research question.

> What drives the police officers' decisions of using the EPSS in their jobs?

In order to find the answer to the question above, the quantitative phase of this study explains user acceptance of the EPSS on the basis of TAM (Davis et al., 1989). TAM focuses on the nature of the relationships among perceived usefulness, perceived ease of use, attitude toward usage, behavioral intention to use, and actual usage to explain user acceptance of an information system. The present study does not take into account the actual use because it focuses on the adoption of the EPSS rather than its implementation. In line with TAM, this study tested the following hypotheses of user acceptance of the EPSS in the Crime Scene Investigation and Identification Unit of the Turkish National Police (Figure 1.1).

> **Hypothesis 1 (H1):** The police officers' perceptions of usefulness significantly and positively influence their behavioral intentions to use the EPSS.

> **Hypothesis 2 (H2):** The police officers' perceptions of usefulness significantly and positively influence their attitudes toward using the EPSS.

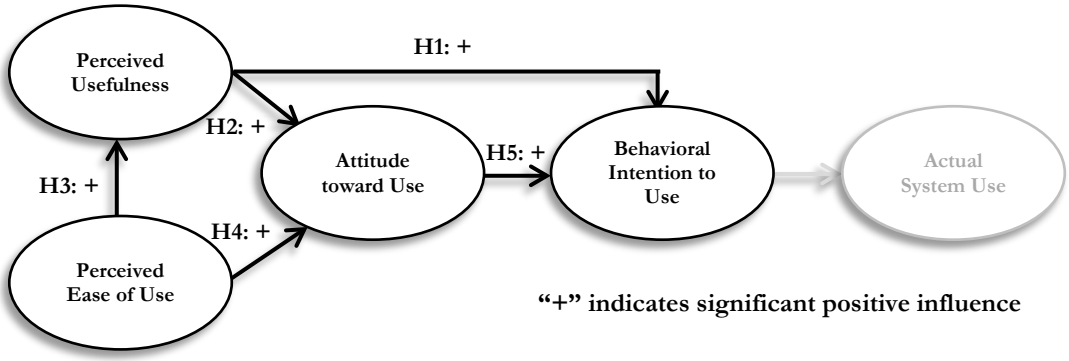


Figure 1.1 Hypotheses tested on the first phase of the study

Hypothesis 3 (H3): The police officers' perceptions of ease of use significantly and positively influence their perceived usefulness of the EPSS.

Hypothesis 4 (H4): The police officers' perceptions of ease of use significantly and positively influence their attitudes toward using the EPSS.

Hypothesis 5 (H5): The police officers' attitudes toward use significantly and positively influence their behavioral intentions to use the EPSS.

In addition to testing these hypotheses, the qualitative phase of the study deeply investigates users' perceptions regarding the usefulness and ease of use of the EPSS. It also explores conditions that facilitate user acceptance of the EPSS. Based on the data obtained from the interviews with the police officers in the Crime Scene Investigation and Identification Unit of the Turkish National Police, the following research questions were answered in the second phase:

Research Question 1: What makes the EPSS useful for the police officers?

Research Question 2: What do the police officers consider when they judge the usefulness of the EPSS?

Research Question 3: What do the police officers consider when they judge the ease of use of the EPSS?

Research Question 4: What conditions do the police officers consider to facilitate the acceptance of the EPSS?

1.6. Definition of Terms

The following part clarifies the definition of the key terms used in the study.

"Adoption" refers to an individual's initial decision to make use of a particular system (Rogers, 2003).

"Attitude toward using" refers to an individual's positive or negative feeling associated with using a particular system in the job context.

"Behavioral intention to use" refers to the degree of likelihood that an individual will use a particular system in his or her job.

"Crime scene investigation" refers to a process including receiving the denouncement and preparing necessary equipment and placement plan; arriving at the crime scene and interviewing with the first team; defining boundaries of the scene and controlling the protection precautions; observing the crime scene and visualizing the crime scene as original; detecting real evidences; taking connected, middle, and close scaled photos of real evidences; preparing the sketch of the crime scene; collecting, protecting, and wrapping of the evidences; receiving the receipt of comparison samples; and arranging the crime scene investigation report and other forms (EGM, 2005).

"Crime Scene Investigation and Identification Unit" is a unit of the Criminal Police Laboratories of the Turkish National Police which are responsible for (a) performing the judicial duties after an incident, or action defined as a crime, (b) finding, defining, collecting, protecting, and wrapping of the real evidences associated with the committed crime, and (c) evaluating and delivering the real evidences taken from the crime scene to the concerned units ("KPL", 2012).

An "Electronic Performance Support System" is a computer-based system which provides on-demand access to electronic tools, information, and resources to enable people to perform their job related tasks successfully and effectively.

"Facilitating conditions" refers to resources that encourage an individual's intentions and usage regarding a particular system.

"Implementation" refers to actual use of a particular system in a work setting (Surry & Ely, 2007).

"User Acceptance" refers to an individual's willingness to use a particular system for the tasks which it is designed to support (Dillon & Morris, 1996).

"Perceived ease of use" is the degree to which an individual believes that a particular system would not require much effort to use (Davis, 1989).

"Perceived usefulness" is the degree to which an individual believes that using a particular system would increase his or her performance on work-related tasks (Davis, 1989).

"The Technology Acceptance Model" is a model which explains user acceptance of an information technology.

1.7. Summary

Because of problems related to forgetting, transferability of learning, and rapidly changing needs in workplaces, training does not necessarily result in successful job performance in workplaces. With the increased prevalence and the capabilities of computers in workplaces, instructional designers consider an EPSS as an intervention to effectively and efficiently solve performance problems faced in an organization. An EPSS provides tools, resources, and information for users to perform job-related tasks successfully. However, regardless how well these systems are designed, they fail to improve job performance if performers do not sufficiently adopt the systems. It is important to understand acceptance of performance support systems to minimize the risk of delivering the system which people reject. TAM is valid, powerful, robust, and parsimonious model to investigate acceptance of an EPSS. Therefore, this study is carried out to explain user acceptance of the EPSS on the basis of TAM; provide insights on users' perceptions regarding the usefulness and ease of use of the EPSS; and explore how to facilitate user acceptance of the EPSS. The present study makes important contributions with respect to user acceptance of the EPSS, factors facilitating successful adoption of the EPSS, future studies, use of TAM as a theoretical base, research context, and mixed methods research design.

CAHPTER II

LITERATURE REVIEW

This chapter presents a review of previous theoretical, conceptual, and empirical studies that serve as a foundation for the present study. It is organized according to three main themes:

(a) Electronic Performance Support Systems,
(b) The Technology Acceptance Model, and
(c) Acceptance of EPSS.

2.1. Electronic Performance Support Systems

In recent years, due to changing demands of work environments, advances in information technologies, and inadequacy of traditional training programs, Electronic Performance Support System (EPSS) interventions have emerged as one of the most prominent ways to improve human performance as well as organizational results. The main goal of performance support systems is to provide performers with "what they need, when they need it, and in the form in which they need it so that they perform in a way that consistently meets organizational objectives" (Villachica & Stone, 1999, s. 443). With such a clear goal, numerous and different definitions of EPSS have been offered since its emergence in the late 1980s.

2.1.1. Definitions of EPSS

The early definitions of EPSS were made by two pioneers of the performance support system movement, Gloria Gery and Barry Raybould. Gery (1991) is the person who coined the term, "Electronic Performance Support System". She describes an EPSS as an electronic system that provides users with on-demand access to integrated information, tools, and methodology in order to support their task performance with the minimum of intervention by others. Similarly, Raybould (1990) defines an EPSS as "a computer-based system that improves worker productivity by providing on-the-job access to integrated information, advice, and learning

experiences" (p. 4). These early definitions approach an EPSS as an add-on linked to existing stand-alone software (Raybould, 1995).

Moreover, Carr (1992) defines an EPSS as a computer-based system which offers "just the help a performer needs to do a job, just when the performer needs it, and in just the form in which he or she needs it" (p. 32). In this definition, three distinct attributes of the support functions come into prominence: the right help, the right time, and the right form. Similarly, Mao (2004) characterizes an EPSS with three distinct principles: "just-in-time, just-enough (minimalist), and performance-centered". (p. 55).

By taking Senge's (1994) system thinking approach, Raybould (1995) has expended the scope of definition of EPSS. He describes an EPSS as an "electronic infrastructure that captures, stores and distributes individual and corporate knowledge assets throughout an organization, to enable individuals to achieve required levels of performance in the fastest possible time and with a minimum of support from other people" (p. 11). This wider perspective focuses on enabling organizational learning through capturing and distributing knowledge throughout an organization. In this respect, EPSSs are more than systems displaying static information.

Villachica and Stone (1999) have also broadened the scope of EPSSs by encompassing electronic as well as non-electronic components. From this point of view, they define an EPSS as "an optimized body of integrated online and off-line methods and resources providing what performers need, when they need it, in the form they need it in" (p. 443).

Furthermore, Cagiltay (2006) provides one of the most detailed definitions of EPSS by addressing various features and capabilities of performance support systems. He makes the following definition of an EPSS:

> An EPSS is a computer-based system that:
> - is comprised of a collection of integrated software components;
> - is a part of an organisation's knowledge management system;
> - is user-controlled and easy to use;
> - provides support at the moment it is needed (right time); and

- presents relevant (right type) and context-focused (right amount) information that a task performer needs, in a real work environment (right place). (p. 94)

Moreover, Clark and Nguyen (2008) give a simple but comprehensive definition of EPSS as an "enabler of work tasks that are delivered by electronic technology provided to individuals or teams at the time of need on the job" (p. 508).

In conclusion, an EPSS can be defined as a computer-based system which provides access to electronic tools, information, and resources for individuals or teams to perform a task at a high level of competency on the job with a minimum support from other people. In order to understand the nature of an EPSS, it is important to clarify components which it contains to develop and support competence in task performance.

2.1.2. Components of an EPSS

The components constitute the building blocks of an EPSS that enable users to perform their tasks successfully and effectively. An EPSS can essentially contain any combination of the following features: task structuring, knowledge, data, tools, and communications (Gery, 2002). There are many different viewpoints with respect to necessary components of an EPSS.

Gery (1991) offers a range of support mechanisms and tools which can be found in an EPSS, including (a) advisor or expert systems, (b) interactive productive software, (c) application software, (d) help systems, (e) interactive training sequences, (f) assessment systems, and (g) monitoring, assessment and feedback. More simply, Raybould (1990) proposes three integrated major components of an EPSS: (a) an advisory system, (b) an information base, and (c) learning experiences. An advisory system gives employees access to interactive assistance to make a decision or perform their tasks. An information base provides access to all information resources which employees may require to perform their tasks. Lastly, learning experiences include many forms of computer-based training courses available to employees.

Based on the early definitions of EPSS, McKay and Wager (2007) also suggest five main components: (a) information base, (b) learning experiences, (c) embedded coaching and help tools, (d) expert advisor, and (e) customized tools. An information

base is comprised of information databases, online documents, and case history databases which enable employees to achieve their tasks. Learning experiences refer to task-specific, computer-based training, tutorials, and simulations to which employees have access while they are performing their tasks on the job. Embedded coaching and help tools provide employees with user or system-initiated support tools to help them perform their tasks as well as use the system. An expert advisor helps employees to make a decision with the use of a series of questions when they perform complex and infrequent tasks. Customized tools refer to business and productivity applications which usually automate work processes and tasks.

In addition, Raybould (1995) stresses an electronic infrastructure that enables capturing, storing, and distributing knowledge assets throughout an organization. In this respect, an EPSS may contain community building and knowledge sharing tools, including bulletin boards, discussion forums, and information searching tools (Ma & Harmon, 2006). Furthermore, the recent broader definitions of EPSS have expanded possible performance support interventions with tools which support performers in decision making, and automate complex and labor-intensive tasks (Nguyen, 2010).

The framework offered by Gery (2002) also classified the basic components of an EPSS into four primary categories: (a) performance support tools or performance centered systems, (b) reference, (c) instruction, and (d) collaboration. Performance support tools or performance centered systems provide users with tools and job aids which structure work flows and help them to achieve specific outcomes. The reference component enables users to perform their tasks with access to information and resources at the moment of need. The instruction component presents small or large instructional units that enable learning out of work context. The collaboration component allows users to interact with others to share and gain several types of information in several ways within the organization.

The components of an EPSS perform four supportive activities: learning, doing, referencing, and collaboration (Gery, 2002). Based on the supportive functions, the components of an EPSS can be classified as in Table 2.1.

The user interface is an important element of an EPSS which influences quality of support provided by its components. In a basic 'four layer' model for EPSS

Table 2.1

Summary of Classifications of the Components of an EPSS Based on the Supportive Functions

	Doing	Referencing	Learning	Collaboration
Gery (1991)	• Interactive productive software • Application software	• Help systems • Advisory or expert systems • Monitoring, assessment, and feedback	• Interactive training sequences • Assessment systems	
Raybould (1990)		• Information base • Advisory systems	• Learning experience	
McKay and Wager (2007)	• Customized tools	• Information base • Embedded coaching systems • Expert advisor	• Learning experience	
Gery (2002)	• Performance support tools or performance centered systems	• Reference	• Instruction	• Collaboration
Others	• Tools automating the tasks (Nguyen, 2010)	• Decision support (Nguyen, 2010)		• Community building and knowledge sharing tools (Ma & Harmon, 2006)

formulated by Barker and Banerji (1995), the first layer is the human-computer interface because it enables users to access and control the facilities at lower levels. In other words, users interact with the components of an EPSS through the user interface to obtain assistance necessary to perform job-related tasks. Therefore, user interface is a critical element for a successful EPSS implementation (Barker, 2010a; Cagiltay, 2006; Milhelm, 1997; Rossett, 1996; van Schaik, 2010). An EPSS should enable performers to perform their task successfully, and in the fastest time, with a minimum support from others (Raybould, 1995). To minimize training and ensure ease of use, user interface should be consistent with workflow and logic of the job and filter the information (Villachica, Stone, & Endicott, 2006). In terms of user-system interaction, it is important to consider not only user-friendliness, but also user-control (Carr, 1992).

2.1.3. Types of an EPSS

Based on the extent to which performance support systems are integrated into users' work interface or process, they are categorized in different ways. Gery (1995) suggests three fundamental types of performance support systems: intrinsic, extrinsic, and external. Intrinsic support is directly integrated with work interface and process. This type of performance support system is a basic part of an EPSS. It is "so integrated into the interface structure, content, and behavior and the application logic that it is impossible to differentiate it from the system itself" (Gery, 1995, p. 51). Users get intrinsic support while they are just performing their tasks without having awareness of their using EPSS facilities. Examples of intrinsic support include user-centered design, embedded knowledge, wizards, and task automation tools.

Extrinsic support is "integrated with the system, but is not the primary workspace" (Gery, 1995, p. 51). Based on task and employee situations, EPSSs provide relevant tools and resources which can be invoked by employees or the system. Although extrinsic support is integrated with tasks at hand, it is not inherent to primary work interface or actual work flow. Examples of extrinsic support include embedded cue cards, tips, guides, help links, and context sensitive help.

Lastly, external support is not integrated with either the system or the primary workspace. The difference between external support and extrinsic support is that the former has no prior integration with systems and tasks (Gery, 1995). External supports force employees to locate appropriate tools or resources external to EPSSs. In this respect, employees are required to interrupt workflows to get performance support. External performance support may or may not be in an electronic form. Examples of external support include external databases, search engines, help indexes, and job aids.

With respect to the types of an EPSS, the most cited notion is that if performance support systems are more integrated into users' work interfaces, they will be more powerful. In terms of the design of an EPSS, Gery (1995) stresses that the goal is to integrate almost 80% of performance support as intrinsic, and the remaining part as extrinsic and external with almost equal percentage. Similarly, Raybould (2000) asserts that "as support moves closer to the tool and in the process becomes more

granular, it becomes more powerful to use and less expensive in terms of lost time on the job" (p. 35).

In a study on effect of different types of the performance support systems on user performance, attitudes, system use, and time on task, Nguyen, Klein, and Sullivan (2005) conclude that users provided with intrinsic and extrinsic support have significantly higher performance than ones provided with no support, while there was no significant difference between users with external support and those with no support. Moreover, users provided with the EPSS had significantly more positive attitude than those not provided with the EPSS.

2.1.4. EPSS versus Training as an Performance Intervention

Training is the most common intervention used by organizations to improve employees' performance as well as organizational results. Traditional training interventions involve "predesigned and developed instruction, practice, and assessment activities with the goal of increasing learner proficiency on desired behavior or attitudes" (Nguyen & Klein, 2008, p. 95). After performance problems occur in workplaces, employees attend training programs to learn skills and knowledge required for tasks, and then they are expected to transfer what they are taught into actual job contexts. In such situations, working and learning are two separate events in terms of place and time. Therefore, there is a risk of not transferring what was learned into their actual job contexts (Baldwin & Ford, 1988; Hodges, 2002; Mao, 2004; McKay & Wager, 2007). In addition, training may not be a cost-effective solution to address performance problems because of the cost of designing and delivering training and the loss of productivity while employees are away from their jobs to attend training (Stolovitch & Keeps, 1999).

Designing more involving training activities, linking training to working more, and using technology improve training programs. In these programs, however, the basic process to enhance both learning and performance has remained the same: instruction. Instruction, or learning, is still a distinct event from working. For example, Laffey (1995) asserts that although just-in-time training make an important contribution to development of work competencies, it do not necessarily make training appropriate for a particular context. Moreover, Gery (2002) holds that

"[m]uch training programs provides 'too much too soon', 'too little too late', or is totally inappropriate to a given person at a given moment in time" (p. 472). Nguyen and Klein (2008) also argue that the common issue in all training interventions is that "employees are asked to learn and master the desired outcomes prior to applying the information to their work" (p.95).

On the other hand, EPSS interventions improve performance as well as learning while the employees are performing their tasks. They eliminate a distinction between learning and working, and thereby allow learning in work contexts (Bastiaens, Nijhof, Streumer, & Abma, 1997; Rosenberg, 1995). With the help of performance support systems, knowledge required for successful work performance is made available at the time of need while tasks are actually being performed (Cole, Fischer, & Phyllis, 1997). Therefore, these systems enable performers to learn a process while they guide them to perform their task (Gery & Jezsik, 1999). In this respect, learning is a result of performing the tasks with the use of the EPSS. In terms of what differentiates EPSSs from training, Nguyen and Klein (2008) argue that "EPSS interventions focus on supporting performance while the work is being performed rather than at some arbitrary point in time beforehand as with training" (p. 96).

However, even though learning may or may not occur with the use of an EPSS, the primary focus is performance (i.e. productivity and competence), not learning (i.e. skill and knowledge) (Rosenberg, 1995). In line with performance-centered approaches, EPSS environments are formed from "small granules of performance-oriented support to get the current task done, as opposed to comprehensive presentation of function-oriented information for learning in abstract" (Mao, 2004, p. 55). EPSS facilities emphasize performance support on the job rather than learning objectives to enhance performance. This approach is more consistent with the paradigm of performance technology rather than training.

Despite the fact that EPSSs have evolved beyond training in many ways and require paradigm shifts away from training, the roots of EPSSs are based on education and training. The theoretical perspectives behind EPSSs represent a convergence with several theories of learning. Nguyen and Klein (2008) point out that EPSSs are based on the theory of adult learning in terms of personal relevance. By citing Knowles

(1996), they state that adults learn better when learning is relevant to their previous experience and they can immediately apply what they learn. Moreover, Maughan (2005) argues that constructivism is a learning theory most related to EPSS practices. Performance support systems enable performers to actively construct their own knowledge by meeting the information demands while they are performing the tasks. Furthermore, van Schaik (2010) emphasizes the cognitive psychology perspective because performance support tools are designed to enhance human cognitive structure and reduce cognitive load. Also, Mao (2004) argues that the common underlying philosophy of EPSSs is based on nesting learning into working, "learning-by-doing". This philosophical perspective draws from a range of learning theories, including cognitive learning, impasse-driven learning, constructivism, and situated learning.

2.1.5. Benefits of Using an EPSS

The implementation of EPSSs provides a number of benefits for organizations. According to Nguyen (2010, 2012), tangible advantages of using an EPSS include (a) improved performance, (b) improved attitudes, and (c) reduced costs. The study conducted by Nguyen and Klein (2008) reported that participants provided with only the EPSS and those provided with the EPSS and training completed their task in less time and with more accuracy than those provided with only training. Also, Nguyen (2009) examined the effects of performance support and training on user attitude, and concluded that users receiving the EPSS and those receiving the EPSS and training had significantly higher attitude scores than those receiving only training. Furthermore, Desmarais, Leclair, Fiset, and Talbi (1997) conducted the cost-benefit analysis of an EPSS that provides customer service representatives with assistance in performing their tasks in a large electric utility company. This study demonstrated that benefits stemming from reduced training outweigh the cost of development and maintenance of the EPSS. Moreover, the researchers assert that the other benefits resulting from improved productivity and increased quality could contribute to outcome and return of investment of EPSSs.

Besides the tangible advantages, Nguyen (2010, 2012) also proposes three less tangible benefits resulting from implementing an EPSS. These benefits include

providing (a) memory support especially for tasks which they perform infrequently, (b) updated information, and (c) a wider range of support content that cannot be exposed in training.

Bayram (2005) proposes a conceptual framework of EPSS for training and educational implications. This framework consists of five interrelated and interdependent domains: online collaboration, motivation, guidance, cost-effectiveness, and performance empowering. Each domain addresses a particular benefit of using an EPSS.

Moreover, Desmarais et al. (1997) assert that an EPSS offers several benefits if it is favorable for a work condition. The benefits of using an EPSS include enhanced productivity, reduced training costs, increased worker autonomy, increased quality due to uniform work practices, and knowledge capitalization. In addition to these benefits, Altalib (2002) points out a decrease in the system maintenance cost with the use of an EPSS due to performance-centered principles on which the design of an EPSS is based. Furthermore, Nguyen and Klein (2008) emphasize reducing in the need of training, and "day-one performance" as the most attractive EPSS feature. Also, Gery (1991, 2002) points out that major benefits resulting from using an EPSS include encouraging the best practices in work environments, organizational strategy, and desired organizational accomplishment.

2.1.6. Design and Development of an EPSS

The design and development process is one of the most important factors that determine the success of an EPSS in an organization. In order for an EPSS to have considerable benefits for an organization, its structure and components need to be designed and developed in an appropriate way (Milhelm, 1997). Unfortunately, there seems to be no clear, detailed, and concise model or strategies for the design and development of an EPSS (Gustafson, 2000; Laffey, 1995; Milhelm, 1997; Nguyen & Woll, 2006). Yet, some substantial efforts have been made.

One approach to designing an EPSS, a basic four-layer model, is offered by Barker and Banerji (1995). This model contains four basic levels and each level represents a particular design aspect. The first level involves the design of a human-computer

interface shell and database facility. The second level presents generic tools that may be selected to meet the needs of the EPSS (i.e. help systems, documentation, text retrieval systems, intelligent agents, tutoring facilities, simulation tools, and communication tools). The third level includes the design of application tools that can fulfill specific needs within application domains. The last level, the application domain, represents the design of new processes and tasks that the EPSS introduces into domains.

Performance-centered design (PCD) is one of the strategies that are used to develop performance support systems. The focus of PCD is on performance of work, rather than systems (Mackenzie, 2002). Using PCD, designers can develop performance-centered systems "with explicit representations of the business process being supported by work …, integrating the software that support the process in a natural way, providing just enough content needed to execute the tasks when it is needed …, and arranging other performance-enabling artifacts appropriately in the environment …" (Rosenberg, 2006, pp. 202-203). In PCD, knowledge is integrated into the interface on which actual job is done (Mackenzie, 2002; Villachica et al., 2006). By taking performance-centered viewpoint, Gery (1995) proposes specific attributes which performance support system should contain. Marion (2002).has expanded to these attributes by considering a number of developments. These attributes are addressed the issues related to work context, the user interface, user-system interaction, system behavior and options, knowledge access and use, and consistency.

Milhelm (1997) also illustrates specific guidelines for the design and development of an EPSS. He especially focuses on interactivity of, and effective user interface for the design of the overall system and components. In line with this perspective, systems should have specific attributes such as a high degree of user control, flexibility, ease of use, and accessibility. Furthermore, Milhelm suggests specific guidelines on the basis of interactivity and user interface for each component of an EPSS (i.e. an information database, advisory system, instructional component, and application software). Regarding general development strategies, one of the most important issues is the overall systematic design process undertaken before and during the development of an EPSS.

More recently, Nguyen and Woll (2006) developed a model for the design and development of performance support systems, "A Practitioner's Model for Designing EPSS". This model consists of five phases. The first phase of the model, performance analysis, focuses on the steps of performance analysis which identify performance problems and verify an EPSS as the appropriate performance intervention for the problems. The second phase, EPSS analysis, involves quantitative and qualitative need assessment directly related to the EPSS. The third phase of the model, EPSS design, includes selecting appropriate EPSS types, developing high- and low-level architecture, and validation of the design of the EPSS with customers. The next phase, EPSS development, is comprised of four steps: developing or purchasing the EPSS, developing content of the EPSS, integrating the EPSS into users' work interfaces, and validation of development practices with customers. The last step, the implementation and evaluation of EPSS, focuses on the adoption and validation of usefulness of the EPSS.

However, no matter how well an EPSS is designed and developed, it is important to consider other contributing factors for successful EPSS use. Employees may resist using performance support systems because they introduce changes in the nature of their job and roles (McKay & Wager, 2007; Stone & Villachica, 2003). Even if an EPSS is designed and developed in an elegant way, it becomes meaningless when it is never used by employees (Gery, 1991). EPSSs should be implemented successfully in order to achieve their potential for improving performance. Therefore, it is critical to develop an appropriate groundwork to minimize users' resistance to change and enhance acceptance and usage of performance support systems in workplaces.

2.1.7. Acceptance, Diffusion, and Implementation of an EPSS

The integration of an EPSS into a work environment is one of the most important processes influencing its effectiveness. If an EPSS is not used at an expected level in an organization, it is unlikely to achieve intended performance goals and benefits (Carliner, 2002; van Schaik, 2010). It is unreasonable to believe that employees readily adopt a well-designed and developed EPSS.

Performance support systems present considerable changes in the way which employees think about technology, work, and training (McKay & Wager, 2007;

Milhelm, 1997; Rossett, 1996; Stone & Villachica, 2003). Therefore, similar to other performance improvement interventions, getting organizations or individuals to accept change is a critical driver for a successful EPSS implementation (Dormant, 1999). Surry and Ely (2007) insist that a better understanding of the reasons of why people adopt and, more importantly, reject using a new technology provides a foundation for making changes happen. There are several factors that influence adoption and diffusion rate of EPSSs. Consequently, in order to minimize or overcome user resistance to an EPSS, it is crucial to identify and understand factors that influence its acceptance.

Based on the principles of performer-centered design, Laffey (1995) indicates that a performer's decision to adopt an EPSS is based on its contributions to successful performance, and its suitability to the work. Moreover, Mao (2004) argues that the adoption of an EPSS depends on its compatibility with user characteristics, information technology tools to be used, and knowledge outcome. In addition, Surry and Ely (2007) claim that organizational structure, communicational channels, and employees' attitude toward the organization may be important sources of user resistance to the EPSS.

In their model, "A Practitioner's Model for Designing EPSS", Nguyen and Woll (2006) underline communication, training, change management, support, and marketing of the system as necessary to ensuring successful adoption of an EPSS by employees. Moreover, Gery (1991) emphasizes a number of important issues for the successful EPSS implementation, including implementation planning, training on EPSS use, the use of EPSS in training programs, administrative procedures and processes, involving other organizational units, and recording the progress in relation to utilization, effectiveness and impact of EPSS use. Also, McKay and Wager (2007) state that ongoing incentives and supplementary training are critical to a successful EPSS development and implementation. Furthermore, Rossett (1996) offers several challenges that influence implementation of an EPSS in the workplaces, including lack of cross-functional coordination, interface frustrations, lack of use preparedness, absence of organizational infrastructure, absence of high-level sponsorship, the cost of the EPSS, and resistance to innovation. Similarly, Maughan (2005) also clearly articulates that successful development and use of an EPSS requires overcoming

challenges regarding communication and computer infrastructure, knowledge management, usability, and presentation.

Gery (1991) also lists sources that cause individuals or organizations to reject using EPSSs. These sources are related to logistics, economics, politics, knowledge, skills, feelings, and values. Gery recommends many powerful tactics to minimize user resistance, including education, demonstrations, case studies, reframing resisters' ideas or opinions, and involvement of opinion leaders. Moreover, Puterbaugh et al. (1989) introduce several barriers to success of an EPSS, which are especially challenging for the trainers. These barriers consist of inapplicability of the methods used for training outputs to the goals of performance support tools, the lack of people supporting new approaches, the infancy of the performance support movement, the difficulty in comparing the development costs of performance support tools with their benefits, insufficient organizational collaboration to design tools, and a lack of sufficient dissatisfaction with the current state of affairs.

Nguyen (2010, 2012) highlights social, political, economic, legal, and technical factors as critical considerations to foster success and adoption of an EPSS. They put emphasis on the following points:

- An EPSS needs to provide employees with timely, relevant and current content.
- Adoption of an EPSS requires developing and implementing a plan to get employees to be aware of the system, its advantages, and the ways to use it on their job.
- The costs of the hardware and software on which an EPSS are developed must be considered.
- The legal requirements of the support content are an important factor to take into account.
- A wide array of electronic tools including laptop computers, mobile devices, and other portable devices needs to be taken into consideration to provide on-the-job performance support.

In addition, Carliner (2002) highlights administrative, political, and ethical issues that have impact on adoption and success of an EPSS. In order to achieve the desired use of an EPSS in an organization:

- Organizations need to promote EPSS solutions, plan for continuous maintenance, and allocate resources for them.
- Users' feelings resulting from the automation of tasks need to be taken into consideration.
- The misperceptions of users regarding the automation and routinization of work need to be addressed.

Most importantly, Barker (2010b) places emphasis on the Technology Acceptance Model (TAM) to address acceptance of an EPSS. As the most widely used and influential model to explain and predict the acceptability of new, innovative information systems, TAM suggests two specific beliefs, perceived usefulness (PU) and perceived ease of use (PEOU), to be fundamental determinants of the user acceptance of the system (Davis, 1989; Davis et al., 1989). PU refers to the degree to which an individual believes that using the system will improve his performance. Likewise, PEOU reflects the degree to which a person believes that using the system will be free of effort. In TAM, PU and PEOU mediate between external variables (e.g. system characteristics, organizational characteristics, and user personal characteristics) and the use of the system (Davis et al., 1989).

For a successful EPSS, the importance of users' perceptions regarding usefulness and ease of use is emphasized by a number of researchers. Nguyen et al. (2005) argue that "if the users feel that the system is annoying or unhelpful, they will not use it and therefore will not maximize the benefits it may offer to aid task performance" (p. 84). Similarly, Nguyen (2010, 2012) claims that if users perceive that the EPSS does not help them rapidly locate the most relevant content to perform tasks correctly, adoption is impeded in the organization. Moreover, Carliner (2002) stresses that EPSSs must be not only usable but also beneficial for the user in order to achieve their performance goals. In addition, Milhelm (1997) maintains that the success of EPSSs is dependent on a number of system characteristics, including high degree of

user control, flexibility, ease of use, high accessibility, and the structure that provides access to information in many ways.

Therefore, in the development of an EPSS, understanding users' perceptions regarding usefulness and ease of use is likely to give valuable information to maximize user acceptance of an EPSS (van Schaik, 2010). In this respect, TAM is likely to provide an appropriate, credible, and powerful theoretical base to identify and understand factors influencing users' decision to adopt an EPSS.

2.2. The Technology Acceptance Model

The Technology Acceptance Model (TAM) (Davis, 1985) is the most widely applied and influential theoretical framework to predict and explain user acceptance of information technology. It attempts to provide a theoretical base to explain why users make the decision to accept or reject a technology. TAM focuses on two particular beliefs: perceived usefulness and perceived ease of use (Davis, 1989, 1993; Davis et al., 1989). Basically, these two distinct and fundamental variables play a mediating role between external factors and system usage. In the light of TAM, understanding the determinants of information technology use allows identifying effective interventions that facilitate users' information technology adoption and use (Davis, 1993; Taylor & Todd, 1995a; Venkatesh & Bala, 2008).

2.2.1. Theoretical Framework

TAM is based on social psychology, particularly the Theory of Reasoned Action (TRA) (Fishbein & Azjen, 1975). According to TRA, a specific behavior is determined by a person's intention to perform the behavior, which is a function of attitude toward the behavior and the subjective norm related to the behavior (Ajzen & Fishbein, 1980). Beliefs play an important role in that they influence people to have a certain attitude and subjective norm. Drawing upon the theoretical underpinning of TRA, TAM proposes causal relationships between beliefs (perceived usefulness and perceived ease of use), attitude, intention, and actual system usage (Davis, 1993; Davis et al., 1989). Figure 2.1 illustrates TRA.

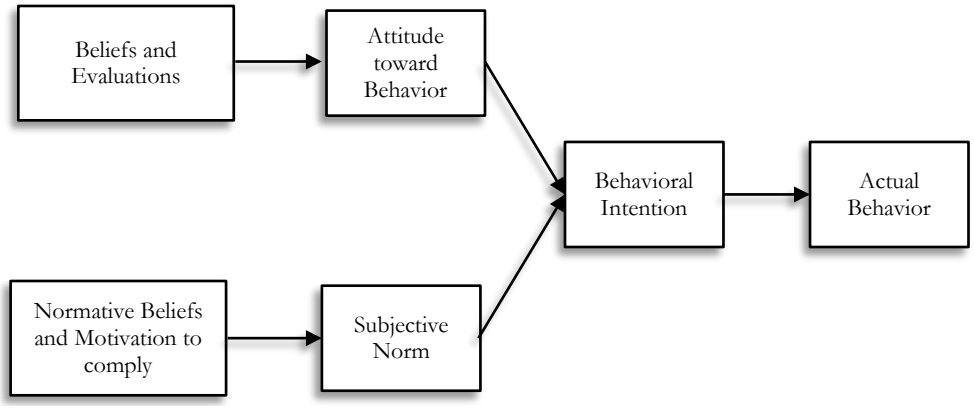


Figure 2.1 Theory of reasoned action

TAM posits that actual system usage is determined by a person's behavioral intention to use (BI) the system, and BI is jointly under control of attitude toward using (A) the system and perceived usefulness (PU) (Davis et al., 1989). A is determined by PU and perceived ease of use (PEU) of the system. PEU also has a direct effect on PU. According to TAM, external variables (e.g., individual characteristics, organizational characteristics, and system characteristics) influence system usage only to the extent that they have an effect on the PU and PEU. TAM hypothesize that PU and PEU are major determinants of user acceptance of information technology. Figure 2.2 illustrates TAM.

Davis (1989) defines perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance" (p. 320). According to TAM, users' beliefs about the performance benefits of a system largely

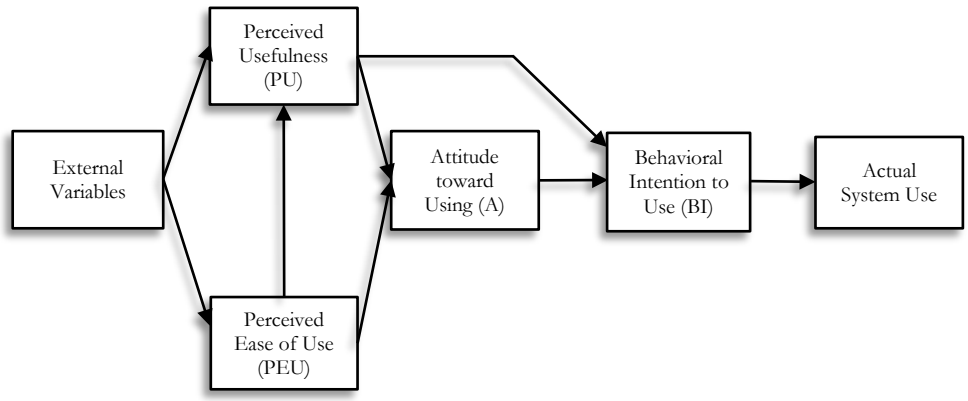


Figure 2.2 Technology acceptance model.

influence their attitude regarding system usage and, in turn, their usage intention. In addition to an indirect effect, PU also has a direct effect on BI. Users tend to use a system when they believe that it improves their performance on the job, regardless of their positive or negative feelings toward using it (Davis et al., 1989). Furthermore, PU is a stronger determinant of user acceptance then PEU (Davis, 1989, 1993; Davis et al., 1989; Hu, Lin, & Chen, 2005; Venkatesh & Davis, 2000). When the functionalities and features of a system provide performance gains for users, they are more likely to deal with any difficulty in use it (Davis, 1989). On the contrary, if a system is not useful for users, ease of use becomes irrelevant.

According to Davis (1989), perceived ease of use represents "the degree to which a person believes that using a particular system would be free of effort" (p. 320). TAM posits that users have a positive attitude toward using a system when they believe that it is easy to use. According to TAM, it is also hypothesized that, given all other things being equal, the easier a system is to use, the more useful users find it, but not vice versa – that is PEU's direct effect on PU (Venkatesh, 1999, 2000). Davis (1993) notes that PEU functions primarily through its direct effect on PU rather than attitude.

Davis (1993) explains attitude toward using (A) as "the degree of evaluative affect that an individual associates with using the target system in his or her job" (p. 476). Based on the framework of TRA, the original formulation of TAM postulates that A plays a mediating role between the beliefs (i.e. PU and PEU) and BI. However, Davis et al. (1989) eliminated A from TAM because of its partial mediation effect on beliefs-intention relationships, a strong direct effect of PU and PEU on BI, and a weak relationship between PU and A. Accordingly, despite users' negative feelings about the system, they are willing to use the system because of its functionality - that is PU's direct influence on BI. On the other hand, Yang and Yoo (2004) argue that attitude needs to be considered in the context of technology acceptance due to its impact on individual and organizational technology use. In this respect, Jackson, Chow, and Leitch (1997) insist that "[a]ttitude, like other behavioral variables, may be a necessary but not sufficient condition for success" (p. 583).

BI is a major determinant of system usage. Ajzen and Fishbein (1980) defined behavioral intention as "a measure of the likelihood that a person will engage in a given behavior" (p. 42). TAM hypothesizes that BI predicts usage behavior and mediates the influence of other factors on users' behaviors (Davis et al., 1989). Users' usage intentions have an important function to predict eventual system usage (Mathieson, 1991).

Regarding the dependent variable, actual system use, TAM studies commonly measure number of uses (i.e. frequency) or time spent using (i.e. duration) (Yousafzai, Foxall, & Pallister, 2007b). In their analysis of 22 studies used TAM, Legris et al. (2003) show that measurement of use was commonly based on self-reported usage. In addition, measurement of use was ignored in ten of the 22 studies. This finding is also consistent with the results of the study conducted by Yousafzai et al. (2007b). They found that 43 percent of 145 TAM studies focused on only determinants of intention to use a system.

The original formulation of TAM takes account of all relationships among the five components: PU, PEU, A, BI and actual usage. The relationships in TAM demonstrate a substantial variability across the studies (Lee et al., 2003; Legris et al., 2003; Yousafzai et al., 2007a). King and He (2006) point out that TAM has experienced evolution by incorporating factors which can be classified into four major categories: (1) prior factors (the antecedents of the beliefs), (2) factors offered by other theories that have the potential to increase predictive ability of TAM, (3) contextual factors that have mediator effects, and (4) consequent factors. The evolutionary nature of TAM is also well illustrated by Sharp (2007) and Lee et al. (2003). As a conclusion, several modifications of TAM are presented in the related literature of technology acceptance.

2.2.2. External Variables and Internal Beliefs

One of the purposes of TAM is to provide insight into the influence of external factors on users' behaviors. The external variables have an impact on A, BI, and actual usage through their direct effect on two key drivers of technology acceptance: PU and PEU (Davis, 1993; Davis et al., 1989; Venkatesh & Bala, 2008; Venkatesh & Davis, 2000). In addition, these variables also take a crucial role to manipulate PU

and PEU. Yousafzai et al. (2007a) claim that "without a better understanding of the antecedents of PU and PEU, practitioners are unable to know which levers to pull in order to affect these beliefs and, through them, the use of technology" (p. 268). Researchers have tested a number of external variables that play determinant roles on PU and PEU.

Design characteristics, user involvement in system development, the type of system development process, the nature of the implementation process, and cognitive style are some of the external factors that are proposed to influence people's perceptions related to usefulness and ease of use (Davis et al., 1989). Moreover, as a result of the synthesis of studies on TAM, Venkatesh and Bala (2008) propose four different types of the determinants of individuals' perceptions regarding usefulness and/or ease of use:

- Individual differences (i.e. personality and demographics)
- System characteristics (i.e. the attributes of the system)
- Social influence (i.e. social processes and mechanisms)
- Facilitating conditions (i.e. organizational support)

Further, Yousafzai et al. (2007a) proposes four distinct categories for more than 70 external variables influencing PU and/or PEU:

- Organizational characteristics (e.g. end-user support, organizational structure, management support)
- System characteristics (e.g. navigation, compatibility, perceived complexity)
- User personal characteristics (e.g. computer anxiety, self-efficacy)
- Other variables (e.g. facilitating conditions, social influence, external computing training)

Although some studies have focused on context-dependent determinants of PU and PEU, some other studies have offered general and context-independent determinants that can be applied across a broad array of settings. Venkatesh and Davis (2000) introduce general determinants of PU – that is, perceived ease of use, subjective norm, image, job relevance, output quality, and results demonstrability. This model

also includes two moderator variables: voluntariness and experience. Furthermore, Venkatesh (2000) has developed and tested a theoretical framework for general determinants of PEU, which focuses on anchoring and adjustments perspectives. According to this framework, constructs related to control (computer self-efficacy and perception of external control), intrinsic motivation (computer playfulness), and emotion (computer anxiety) influence users' early perceptions of ease of use. After the users gain experience with the technologies, objective usability and perceived enjoyment have more effect on their perceptions of ease of use. In addition, Venkatesh and Bala (2008) provided a comprehensive integrated model by combining the determinants of PU and PEU. This model also considers a mediation effect of experience and voluntariness on information technology use, and handles a crossover effect between the determinants of perceived usefulness and those of perceived ease of use.

2.2.3. Superiority of TAM

Among the theories and models that address individual-level information technology adoption and use, TAM is regarded as the most appropriate, powerful, robust, and parsimonious theoretical base to investigate user acceptance of information technology due to the following reasons.

- TAM is a specific model for the domain of information technology (Agarwal, 2000; Sharp, 2007).
- TAM has a great practical value due to having a strong theoretical base and sufficiently validated inventory of psychometric measurement scales (Davis, 1989; Yousafzai et al., 2007a).
- TAM adequately explains and predicts information technology acceptance in a wide range of technologies, user populations, situations, cultures, countries, and expertise levels (Chuttur, 2009; Lee et al., 2003; Ma & Liu, 2004; Venkatesh et al., 2007; Yousafzai et al., 2007a).
- TAM provides consistently good predictive validity to technology usage (Leong, 2003; Yousafzai et al., 2007a).

TAM has been used to investigate acceptance of information technologies in many contexts, including education (e.g. Ma, Andersson, & Streith, 2005; Teo, 2010; 2012),

health care (e.g. Ketikidis, Dimitrovski, Lazuras, & Bath, 2012; Pai & Huang, 2011), banking (e.g. Lee , 2009; Pikkarainen, Pikkarainen, Karjaluoto, & Pahnila, 2004), online shopping (e.g., Koufaris, 2002, Lim and Ting, 2012), and business (e.g., Amoako-Gyampah & Salam, 2004; Riemenschneider, Harrison, & Mykytyn, 2003).

2.2.4. Criticisms on TAM

Even though TAM is the most widely applied theoretical framework on information technology adoption and use, it has been subject to several criticisms. First of all, the research subjects of previous TAM studies often involved students (Lee et al., 2003; Legris et al., 2003). Due to differences in characteristics between students and employees, the generalizability of findings in the previous TAM studies is limited (Yousafzai et al., 2007a). Thus, TAM studies provide more benefits if they are conducted in organizational contexts.

Secondly, Benbasat and Barki (2007) argue that PU and PEU have been regarded "as black boxes that very few tried to try open" (p. 212). Similarly, Lee et al. (2003) indicate that one of areas that need to be considered in TAM studies is the examination of factors that contribute to ease of use and usefulness of different information technologies and environments. Without an understanding of what makes a system useful and easy to use, it is unable to get valuable and practical recommendations for its acceptance. Therefore, there is a need to get an in-depth understanding of the antecedents of usefulness and ease of use in order to obtain practical benefit from TAM studies.

Thirdly, and related to the previous point, although studies on TAM have proposed a number of external variables that contribute to an understanding of the antecedents of PU and PEU, the pattern for choosing external variables associated with a specific information technology and environment is not clear (Legris et al., 2003). Likewise, Benbasat and Barki (2007) acknowledge that because of a number of versions of TAM and TAM based models, researchers have difficulty deciding which adoption model is the most appropriate for their research context. Therefore, it is a challenge for researchers to identify external variables regarding a specific information technology and technology.

Fourthly, studies on TAM need to consider the dynamic nature of organizations to present a more predictive and comprehensive model related to acceptance of information technologies. According to Orlikowski and Hofman (1997), the success of any change process related to technology implementation depends on interaction among three dimensions: technology, organizational context, and the change model used to manage change. In addition, Bagozzi (2007) stresses the importance of group, social, and cultural factors in decision making for technology acceptance. Therefore, in order to increase predictive ability of TAM studies, it is necessary for researchers to introduce a broader model that incorporates organizational dynamics and social factors (Legris et al., 2003).

2.2.5. Diffusion of Innovations and TAM

Rogers' (2003) diffusion of innovations is a theoretical framework that explains adoption of an innovation within a social system. He defines diffusion as "the process by which an innovation is communicated through certain channels over time among the members of a social system" (p.5). According to this definition, the diffusion of innovations has four main elements: (1) the innovation, (2) communication channels, (3) time, and (4) a social system (Rogers, 2003).

According to the Innovation-Decision Process model, Rogers (2003) argues that the adoption of an innovation is the process in which an individual goes through five stages: (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation. In the first stage, "Knowledge", individuals gains knowledge of existence of an innovation and understand what it is and how it works. In the second stage, "Persuasion", individuals form positive or negative attitude toward an innovation. In the third stage, "Decision", an individual decide to adopt or reject to use an innovation. In the fourth stage, "Implementation", an individual makes actual use of an innovation. In the last stage, "Confirmation", an individual tries to obtain reinforcement of an innovation-decision and continues or discontinues using an innovation.

According to Rogers (2003), there are five adopter categories on the basis of innovativeness: (1) innovators (i.e., individuals who are ready to adopt an innovation), (2) early adopters, (3) early majority, (4) late majority, and (5) laggards

(i.e., individuals who are last to adopt an innovation). This categorization suggests that particular individuals adopt an innovation earlier than others. Rogers uses the normal frequency distribution for classifying adopters. According to this distribution, he gives the approximate percentages of individuals in each category during adoption of an innovation. Innovators comprise 2.5% of individuals; early adopters: 13.5% of individuals; early majority: 34% of individuals; late majority: 34%; and laggards: 16%. According to Surry and Ely (2007), adopter categorization indicates that adoption of an innovation in an organization is a natural, predictable, and lengthy process.

Rogers (2003) also proposes that earlier adopters differ from later adopters in terms of socioeconomic characteristics, personality variables, and communication behaviors. In terms of socioeconomic characteristics, earlier adopters have more years of formal education, more literacy, higher social status, a greater degree of increasing social mobility, and larger-sized units than later adopters. With respect to personality variables, earlier adopters have greater empathy, less dogmatism, a greater ability to handle abstraction and complexity, greater rationality, more intelligence, more favorable attitude toward change and science, less fatalism, and higher aspirations than later adopters. Lastly, regarding communication behavior, earlier adopters have more social participation, more interconnections, more cosmopolitan orientation, more contact, greater exposure to mass media communication and inter-personal communication, more active in seeking information about an innovation, greater knowledge of an innovation, and a higher degree of opinion leadership than later adopters

According to Rogers (2003), adoption of an innovation takes the form of an S-shaped curve. This curve indicates that adoption of an innovation is slow over initial time period, then rises rapidly in a sudden time period, and thereafter levels off gradually. While some innovations diffuse rapidly so the S-curve rises at a sharp angle whereas others diffuse slowly so the S-curve rises gradually.

Rogers (2003) suggests five attributes of innovations on which individuals' perceptions influence its rate of adoption. These five attributes of an innovation are (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability. Individuals are adopt an innovation quickly if the innovation is a better

than the alternatives; is compatible with their values, experiences, and needs; is easy to understand and use; can be tried out; and has observable results. In addition to these attributes, Rogers points out that the type of innovation-decision, communication channels, the nature of social system, and the extent of change agents' promotion efforts are other variables that explain the rate of adoption.

There are similarities between Rogers' (2003) diffusion of innovation and Davis et al.'s (1989) TAM. First of all, both approaches indicate that actual use of an information system is influenced by individuals' attitudes and decisions, or behavioral intentions, to adopt it. Secondly, both approaches focus on similar perceived attributes of an information system which influence adoption rate of an information system. Rogers' relative advantage is similar to perceived usefulness while complexity is similar to perceived ease of use (Karahanna, Agarwal, & Angst, 2006; Moore & Benbasat, 1991). Laslt, in addition to these attributes, both approaches focus on other variables which influence adoption rate. It can be suggested that external variables in TAM have an impact on shape of Rogers' S-curve.

2.3. Acceptance of EPSSs

There are a number of studies in relation to the adoption, diffusion, and implementation of EPSS interventions. They differ in focus, theoretical perspective, user population, context, and research methodology employed. Although TAM is not widely applied in these studies, many of them include some of the basic constructs used in TAM.

A non-experimental and correlational study was conducted by Habelow (2000) to explore the relationships between the variables related to the tool, user, environment, and usage of the web-based EPSS. In this study, the performance support system was designed to provide job-related procedures and information for telephone banking in a large national bank. The independent, or predictor, variables included general attitudes toward computers, job experience, management support, perceived ease of use, perceived usefulness, previous computer experience, and system training and technical support. On the other hand, the dependent variable was EPSS usage. The study used data from 106 of 179 surveys returned by randomly selected call associates. Of the 106 participants, 74% were females, 22% males, and 4% missing.

The results showed that EPSS usage were positively related to job experience, management encouragement, perceived ease of use, perceived usefulness, and training and technical support. Moreover, this study indicated that there were significant relationships between perceived usefulness, perceived ease of use, attitude toward using computers, management encouragement, and training and technical support. Furthermore, the results of a stepwise multiple regressions indicated that system training and technical support (ß = .33), perceived usefulness (ß = .32), job experience (ß= -.21), and management encouragement (ß = .17) were significant predictors and accounted for 55% variance of EPSS usage. The results showed that the best predictors of EPSS usage were training and technical support, and perceived usefulness.

Moreover, Barker, van Schaik and Pearson (2005) conducted a study to evaluate prototypes of the EPSS that was designed to facilitate learning in relation to psychological research methods. It specifically focused on skill and knowledge acquisition, system usage, and acceptance of the EPSS. This evaluation study collected data from 89 psychology students through a questionnaire. The results of the descriptive analysis indicated that the EPSS was successful in improving student performance in tasks regarding quantitative research methods. Moreover, very high median scores to items related to perceived usefulness and intention to use showed that students found the EPSS as useful in terms of learning, revision, and completing assignments, and intend to use it when it is available to them. Using Kendall's tau, this study also revealed significant correlations between acceptance measures. This finding confirmed the relationship between intention to use and perceived usefulness proposed in technology acceptance research.

As a part of their study on cost-benefit analysis of the EPSS, Desmarais et al. (1997) performed experiments to address the capability of the EPSS to decrease initial learning and increase users' performance. At the end of experiment sessions, the subjects were asked to complete a questionnaire to provide their opinions on perceived usefulness of the EPSS, which was designed for customer service representatives in a large utility company. The result of the study demonstrated that both novice and expert users perceived the EPSS to be useful. In particular, the

experiments evidenced that the EPSS presented useful knowledge related to tasks, so novice users performed well on their tasks without participating initial training.

In an educational setting, Moore and Orey (2000) investigated teachers' use of the EPSS and examined influence of EPSS usage on their work performances and attitudes toward computers. The data were collected from four middle school teachers through observation, questionnaire, anecdotal log, database records, and interviews. The findings revealed that the EPSS enabled the teachers to save time and become more efficient in preparing progress reports. Moreover, usage, performance, and attitude were influenced by a number of elements: the agent of change, interventions, collaborative design, system characteristics, technology support, training, work responsibilities, computer accessibility and technology attributes. Also, this study indicated that the teachers' performance, their interactions with the technology support people, and the customizability of the system were important factors that had an impact on their attitudes toward the EPSS and technology.

In addition, Chang (2004) examined perceived benefits of EPSS implementation, perceived performance level of EPSS components, and the contributions of these components to perceived benefits in business organizations. The study used the data from 79 valid returned surveys of 182 mailed to EPSS coordinators in selected business organizations throughout the USA. One of the important findings was that the acceptability of EPSS and the number of people using EPSS had a significant positive correlation with perceived overall benefit of EPSS use ($r = .348$, $p < .001$; $r = .45$, $p < .001$ respectively). Furthermore, the results of the multiple regression analysis showed that the acceptability of EPSS ($t = 3.669$, $p < .001$), the number of people using EPSS ($t = 3.84$, $p < .001$), the years of experience in using EPSS ($t = 2.174$, $p < .05$), the data/information base component ($t=2.505$, $p < .05$), and the advisory system component ($t=1.961$, $p < .05$) made the greatest significant contributions to the overall benefit of EPSS use. Further, the acceptability of EPSS ($ß= .386$) made the strongest unique contribution to explaining perceived overall benefit of EPSS use when the variances explained by other variables is controlled.

Another study carried out by Paschall (2004) evaluates implementation of the EPSS which special education teachers used to produce individualized education plans (IEP) for students with special needs. The study collected data from teachers using the EPSS, their supervisors, and their support personnel by using a survey, informant interviews, observations, and a focus group. The findings from the survey, the Stages of Concern Questionnaire, revealed that many of the teachers had concerns related to uncertainty about the demands of the system and their ability to meet them, whereas nearly half of them had low-level concern related to the system. Moreover, this study revealed that although the EPSS resulted in time saved to produce the IEP, time was added by data entry and learning how to use the tool. Furthermore, the teachers recommended a central server system, differentiated training, and an update memo to make the EPSS more useful for them.

Furthermore, Chang (2007) investigated perceived barriers and perceived benefits of EPSS use. This study was based on data from 79 returned and valid questionnaires of 182 mailed to EPSS professionals who are responsible for EPSS development and implementation in business organizations. The analysis of the data revealed that organizational barriers and cost are the most important barriers that influence EPSS development and implementation in business organizations. Moreover, decreases in information overload and paper documentation, reduction in time related to training, and increases in productivity and job performance were perceived as the greatest benefits of EPSS implementation. Further, this study showed that using EPSS concepts and user population had an important impact on perceived overall benefits of EPSS implementation.

Gal and Nachmias (2011) also investigated the factors that have an impact on EPSS effectiveness in corporate settings. This study included 294 randomly selected service representatives in a large telecommunications company. The participants were randomly assigned to complete a given authentic, common service scenario with one of the support systems: external or intrinsic. In order to assess the effectiveness of performance support and online learning, time on task, quality of service, level of comprehension, and confidence level were measured in this study. The findings confirmed the superiority of the intrinsic support system over the external one. Moreover, the findings suggested that EPSS effectiveness is based on organizational

environments and workers' experience. In the same research setting, Gal and Nachmias (2012) also examined the effect of users' attitudes on EPSS implementation. The data was collected from 276 randomly selected service representatives in a large telecommunications company. The findings demonstrated that there is a strong relationship between users' attitudes towards EPSS and two EPSS effectiveness variables (i.e., willingness to use the EPSS again and the satisfaction levels from learning with the EPSS). Regarding user acceptance of the EPSS, this study showed that the perceived usefulness of the EPSS was maintained after users experienced it. Therefore, it suggested that it is important to achieve a positive attitude toward the EPSS for a successful implementation. Also, the findings indicated that the use of the EPSS is effective as a learning tool.

2.4. Summary

EPSSs provide electronic tools, information, and resources which enable performers to achieve job-related tasks. The design and development process plays an important role in the success of an EPSS. However, a well-designed and developed EPSS is not readily accepted. No matter how well an EPSS is designed and developed, it fails to improve performance when performers do not accept to use it. Therefore, acceptance is a critical driver for a successful EPSS implementation in an organization. The researchers have offered several factors contributing into acceptance of an EPSS. In addition, TAM is recommended to explain acceptance of an EPSS.

TAM is a model that is widely used to explain user acceptance of information technology. It especially focuses on relationships between beliefs (perceived usefulness and perceived ease of use), attitude, intention, and actual system usage. According to TAM, perceived usefulness and perceived ease of use are distinct and fundamental variables that play an important role in acceptance of an information technology. They mediate effect of external variables on technology use. Past studies proposed a number of external variables which influence acceptance of information systems through their direct effect on perceived usefulness and perceived ease of use.

A great deal of studies has been conducted to understand adoption, diffusion, and implementation of EPSSs. Although the findings have revealed several factors

influencing acceptance of an EPSS, TAM has not been applied to explain it. This study aims to explain and understand acceptance of the EPSS on the basis of TAM.

CHAPTER III

METHODOLOGY

This chapter describes the research methodology undertaken to accomplish the purpose of the current study. It includes research questions and hypotheses, the research design, the context of the study, the selection of participants, instrumentation, data collection procedures, data analyses, assumptions, limitations, and validity and reliability issues.

3.1. Research Questions and Hypotheses

The purpose of this study was twofold. First, based on TAM, this study intended to explain acceptance of the EPSS. Therefore, the present study tested the following hypotheses regarding acceptance of the EPSS by the police officers in the Crime Scene Investigation and Identification Unit of the Turkish National Police.

> Hypothesis 1: The police officers' perceptions of usefulness significantly and positively influence their behavioral intentions to use the EPSS.
>
> Hypothesis 2: The police officers' perceptions of usefulness significantly and positively influence their attitudes toward using the EPSS.
>
> Hypothesis 3: The police officers' perceptions of ease of use significantly and positively influence their perceived usefulness of the EPSS.
>
> Hypothesis 4: The police officers' perceptions of ease of use significantly and positively influence their attitudes toward using the EPSS.
>
> Hypothesis 5: The police officers' attitudes toward use significantly and positively influence their behavioral intentions to use the EPSS.

Second, this study investigated the police officers' perceptions regarding the usefulness and ease of use of the EPSS. It also explored facilitating conditions of

acceptance of the EPSS. This part of the study focused on the following research questions.

> Research Question 1: What makes the EPSS useful for the police officers?
>
> Research Question 2: What do the police officers consider when they judge the usefulness of the EPSS?
>
> Research Question 3: What do the police officers consider when they judge the ease of use of the EPSS?
>
> Research Question 4: What conditions do the police officers consider to facilitate the acceptance of the EPSS?

3.2. The Research Design of the Study

The research design employed in the present study is based on mixed methods research. Put simply, this research design combines or mixes quantitative and qualitative research methods in a single study. Analyzing a variety of perspectives in mixed methods research, Johnson, Onwuegbuzie, and Turner (2007) define this research approach as follows.

> Mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration. (p. 123)

The use of both quantitative and qualitative methods enables researchers to obtain a better understanding of the phenomenon under investigation than does using either method alone (Creswell, 2012). In this approach, researchers take strengths of one method to balance weakness of the other method (Fraenkel, Wallen, & Hyun, 2012; Johnson & Onwuegbuzie, 2004).

The central tenet of mixed methods research is to design a research process that provides useful answers to research questions (Johnson & Onwuegbuzie, 2004). Mixed methods research is considered on a continuum from mono-method designs (i.e., quantitative or qualitative research design) to fully mixed method designs (Leech

& Onwuegbuzie, 2009). The region between mono-method designs and fully mixed designs falls into partially mixed designs. Whereas fully mixed design refers to using both quantitative and qualitative techniques within or across phases of the research process, partially mixed design refers to conducting a quantitative study and a quantitative study in an overall research study and integrating their findings at some points.

According to Leech and Onwuegbuzie (2009), researchers employ three criteria to specify type of design model employed in a mixed methods research study.

1. Level of mixing: Is the design of mixed methods research partially mixed or fully mixed?
2. Time orientation: Are the quantitative and qualitative research conducted concurrently or in a specific order (i.e., sequentially)?
3. Emphasis approach: Do the quantitative and qualitative phases have an approximately equal or different weight to answer the research question?

By crossing three criteria, eight types of mixed methods research designs are offered: (a) partially mixed concurrent equal status designs; (b) partially mixed concurrent dominant status designs; (c) partially mixed sequential equal status designs; (d) partially mixed sequential dominant status designs; (e) fully mixed concurrent equal status designs; (f) fully mixed concurrent dominant status designs; (g) fully mixed sequential equal status designs; and (h) fully mixed sequential dominant status designs.

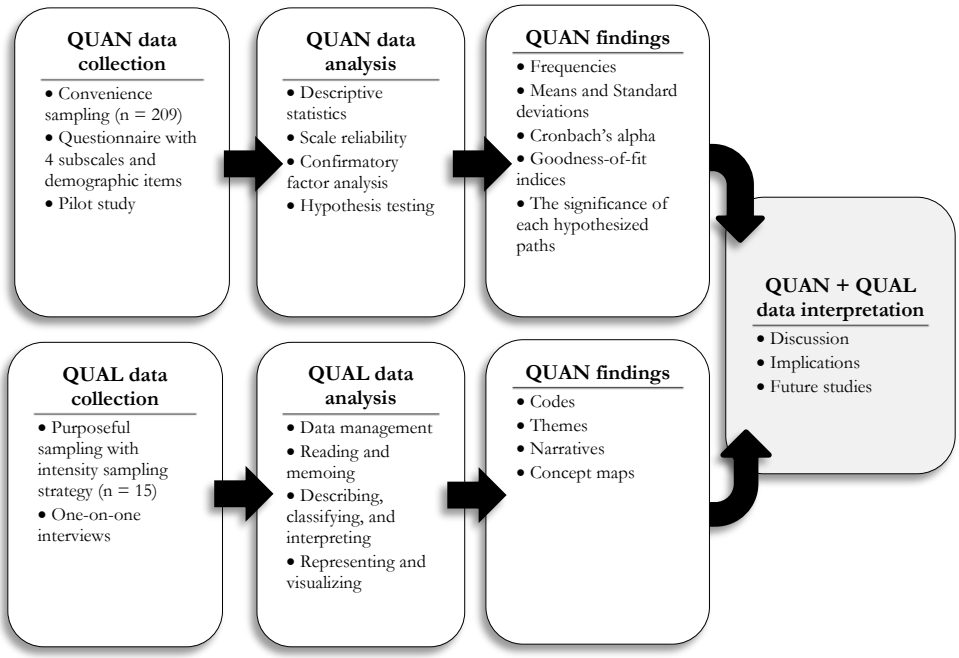
The mixed methods design used in the study is partially mixed concurrent equal status design. In this design, both quantitative and qualitative data collection and analysis procedures were conducted concurrently, but separately and independently, and held approximately equal weight (or emphasis) to fully understand the acceptance of the EPSS by the police officers in the Crime Scene Investigation and Identification Units of Turkish National Police. The quantitative data were collected with a questionnaire and analyzed using Structural Equation Modeling. In the qualitative component of the study, one-on-one interviews were conducted by using the general interview guide approach. The qualitative data were analyzed inductively to obtain an in-depth understanding of the key beliefs and facilitating conditions of

acceptance of the EPSS. The quantitative and qualitative findings were merged in the interpretation stage of the study. The mixed method design used in the study is shown in Figure 3.1.

3.2.1. Rationale for the Design of the Study

There are a variety of situations in which mixed methods research appears as the best research design to address research problems in a study. Creswell and Plano Clark (2011) argue that mixed methods research is more likely to be an appropriate research design in the following conditions.

- The use of one type of research (quantitative or qualitative) does not provide enough data to understand a research problem.
- The results of one type of research (quantitative or qualitative) do not provide complete understanding of a research problem and require further explanation.
- Researchers have a need to generalize the findings obtained by qualitative



Notation: "QUAN" stands for quantitative; "QUAL" stands for qualitative. Capital letters means high weight. "+" stands for mixing

Figure 3.1 The mixed method design used in the study.

approaches.

- The findings attained by using one type of research (quantitative or qualitative) need to be enhanced with the use of another.
- A theoretical perspective presents a framework that entails collecting both quantitative and qualitative data in a study.
- Research objectives can be best understood with the use of both qualitative and quantitative type research simultaneously or sequentially.

In the present study, the main rationale behind using a mixed methods research design was to fully understand the acceptance of the EPSS. The quantitative method allowed the researcher to test the structural relationships associated with the acceptance of the EPSS. However, the quantitative data alone might not be sufficient to obtain a complete understanding of the acceptance of the EPSS because they would be limited to measurement of generalized perceptions in TAM. This type of data also would provide too abstract and general findings for practical implementations to enhance the police officers' acceptance of the EPSS. In addition, the quantitative approach alone would not adequately consider the police officers' social environment and organizational dynamics.

In this situation, there is a need for combination of quantitative and qualitative data to obtain a more complete understanding of the acceptance of the EPSS. The qualitative data provides an opportunity to understand the phenomenon form viewpoint of the participants, identifying the factors which play important roles in a situation (Creswell, 2009). In the present study, the qualitative data collection and analysis enabled the researcher to gain an in-depth and detailed understanding of users' key beliefs associated with the acceptance of the EPSS (i.e., perceived usefulness and perceived ease of use). They also provided insight into the facilitating conditions of the acceptance of the EPSS. In this respect, the qualitative data collection and analysis complemented the quantitative results. In the study, the researcher preferred to conduct the quantitative and qualitative methods at the same timeframe because of limited time for collecting and analyzing data.

3.2.2. Research Paradigm of the Study

It is important to be aware of the underlying paradigm of mixed methods research because paradigms have philosophical assumptions that influence how researchers approach a phenomenon under investigation. A paradigm is defined as a basic belief system or worldview that informs and guides research investigations (Guba & Lincoln, 1994). Paradigms reflect different assumptions related to the nature of reality (ontology), the relationship between researchers and what can be known (epistemology), and the way the researcher finds out it (methodology). In this respect, they influence what can be studied, how to formulate research questions, how to collect and analyze data, and how to interpret the findings.

Mixed methods research is not typically associated with a certain paradigm of either quantitative (i.e., post-positivism) or qualitative (i.e., constructivism) research. It makes use of multiple paradigms and takes pragmatism as the most useful paradigm that guides research practices (Creswell & Plano Clark, 2011; Johnson et al., 2007; Johnson & Onwuegbuzie, 2004; Tashakkori & Teddlie, 1998). According to the incompatibility thesis, quantitative and qualitative research paradigms cannot be combined (Howe, 1988). However, pragmatism contends that it is possible to mix a research paradigm with another one in a single study. Pragmatists focus "on the consequences of research, on the primary importance of the question asked rather than the methods, and on the use of multiple methods of data collection to inform problems under study" (Creswell & Plano Clark, 2011, p. 41). Pragmatists address research questions with any methodological tools available (Tashakkori & Teddlie, 1998). Therefore, researchers take on a "what works" approach for their research problems. In Table 3.1, Creswell and Plano Clark (2011) summarize how research paradigms differ in terms of ontology, epistemology, and methodology.

In this mixed methods research, pragmatism was taken to best address the research problems. Both the quantitative and qualitative approaches were used concurrently, and equally weighed, in order to investigate the acceptance of the EPSS. While the quantitative phase of the study examined the hypothesized relationships in TAM, the qualitative phase of the study allowed for understanding and describing the users' perceptions, thoughts, and experiences regarding the acceptance of the EPSS.

Table 3.1

The Implications of Paradigms for Practice

	Post-positivism	Constructivism	Pragmatism
The nature of reality (Ontology)	Singular reality	Multiple reality	Singular and multiple realities
The relationship between the researcher and that being researched (Epistemology)	Distance and impartiality	Closeness	Practically
The process of the research (Methodology)	Deductive	Inductive	Combining

3.3. Population of the Study

As noted by Fraenkel et al. (2012), a target population refers to the entire group "to which a researcher would really like to generalize" whereas an accessible population refers to a particular group "to which a researcher is able to generalize" (p. 92). The target population of the study is EPSS users in public organizations, especially law enforcement agencies. However, the accessible population consisted of the police officers in the Crime Scene Investigation and Identification Units within the Department of Criminal Police Laboratories of the Turkish National Police. In the study, the police officers in the Crime Scene Investigation and Identification Units in six provinces of Turkey (Ankara, Antalya, Balıkesir, Bursa, Isparta and Kırıkale) were accessible to the researcher (N = 346). The distribution of the police officers by the provinces is given in Table 3.2. The EPSS was specifically designed to provide the police officers with tools and resources to perform the tasks related to crime scene investigation, evidence preservation and distribution, identification, latent print development, and technical imaging.

3.4. Context of the Study

It is necessary to understand the organization and the performance support systems to better interpret the procedures and the findings of the study. The following part

Table 3.2

The Distribution of the Police Officers by the Provinces

	N	%
Provinces		
Ankara	114	32.95
Antalya	79	22.83
Balıkesir	26	8.09
Bursa	96	27.75
Isparta	16	4.62
Kırıkkale	13	3.76

Note. $N = 346$

describes the Crime Scene Investigation and Identification Unit of the Turkish National Police and the EPSS.

3.4.1. The Crime Scene Investigation and Identification Unit

The Crime Scene Investigation and Identification Unit is one of three basic units in the Department of Criminal Police Laboratories of the Turkish National Police. The basic responsibilities of this unit involve (a) performing the judicial duties after the incident or the action defined as a crime, (b) finding, defining, collecting, recording, protecting, and wrapping of the real evidences associated with the committed crime, and (c) evaluating and delivering the real evidences taken from the crime scene to the concerned units ("KPL", 2012).

The Crime Scene Investigation and Identification Unit consists of the Crime Scene Investigation and Identification Branch Offices in the central organization and 81 proviences of Turkey. In the Provincial Police Departments, the Crime Scene Investigation and Identification Branch Office is comprised of seven bureaus, including Administrative Bureau, Crime Scene Investigation Bureau, Technical Visualization Bureau, Biometric Data Processing Bureau, Evidence Protection Bureau, Latent Print Development Bureau, and Quality and Performance Management Bureau. The Latent Print Development Bureau exists only in the Crime Scene Investigation and Identification Branch Offices that have adequate technical and physical infrastructure. In addition, the Quality and Performance Management Bureau is not active but it will be if there is a need for it in a province. In the

districts, there are only Crime Scene Investigation Bureaus, which are accountable to the District Police.

The processes in the Crime Scene Investigation and Identification Units are conducted in accordance with different regulations and bylaws (Yükseloğlu, Özcan, & Ceylan, 2008). According to the Regulation of Duties and Responsibilities of the Crime Scene Investigation and Identification Units announced by the Department of Criminal Police Laboratories of the Turkish National Police, the bureaus and their main responsibilities are illustrated in Table 3.3.

As a unit in the Turkish National Police, the Crime Scene Investigation and Identification Unit has a hierarchical organization structure which consists of police officers and police chiefs in different ranks. All staffs are experts who are trained in a specific expertise area (i.e., crime scene investigation, latent print development, or identification).

3.4.2. The Electronic Performance Support System

In the present study, the EPSS provides information, tools, and resources that enable the police officers to complete the tasks related to a crime scene investigation and identification. The system specifically focuses on the particular tasks in five bureaus of the Crime Scene Investigation and Identification Units:

- Crime Scene Investigation Bureau
- Evidence Protection Bureau
- Biometric Data Processing Bureau
- Latent Print Development Bureau
- Technical Visualization Bureau

The EPSS was integrated into the application software that was designed and developed for the Crime Scene Investigation and Identification Units. While performing several tasks, the police officers need to record several data related to denouncements, teams, crime scenes, evidences, individuals, matching evidences, investigations, analyses, and results. The application software provides a series of text fields, combo-boxes, and list-boxes for the police officers to input and store data

Table 3.3

The Bureaus of the Crime Scene Investigation and Identification Branch Offices and Their Main Responsibilities

Bureau	**Main responsibilities**
Administrative Bureau	Management of ingoing and outgoing documents, personnel affairs, inventory affairs, coordinating maintenance and repairs of the tools..
Crime Scene Investigation Bureau	Receiving denouncements, assigning a team to the crime investigation, investigating the crime scene, detection and collection of real evidences, documentation in relation to the crime scene, preparing the Crime Scene Investigation Report and other forms.
Technical Visualization Bureau	Taking photos of prints, findings, and evidences which other bureaus investigate, taking one's photos for competent authority, recording and keeping photos and videos of the crime scenes, creating an identikit picture.
Biometric Data Processing Bureau	Making a comparison between prints taken form a crime scene and those recorded in the fingerprint system, getting one's fingerprints sample and making a comparison with those in the system for administrative purposes, preparing expertise reports.
Evidence Protection Bureau	Receiving evidences, protecting them against any contaminations, deliver them to concerned departments, tacking them, preparing delivery receipt reports.
Latent Print Development Bureau	Investigating and developing latent prints on the evidences, preparing the expertise reports.
Quality and Performance Management Bureau	Keeping records associated with quality and performance management systems, coordinating maintenance, calibration, and repair of the apparatus, detecting education, personnel, and logistic needs, preparing statistics.

easily. The data entered into the application software are stored in the databases. In accordance with the job responsibilities of the police officers, the application

software authorizes them to access only a particular part of the application. Figure 3.2 shows screenshots from the software application into which the EPSS was integrated.

The police officers can access the performance support systems using mobile personal computers and desktop computers. The mobile personal computers are the fully ruggedized computers that the police officers use while investigating a crime scene. The specifications of the mobile personal computers included 2GB ram, 64 GB solid-state drive, 16.GHz CPU, Intel GPU, backlit keyboard, and a 5.6" WSVGA sunlight-viewable touchscreen. In addition, desktop computers in the bureaus provide access to the performance support system. In the bureaus of the Crime Scene Investigation and Identification Branch Offices, there was at least one desktop computer on which the system runs. The EPSS works on the pol-net network (Police

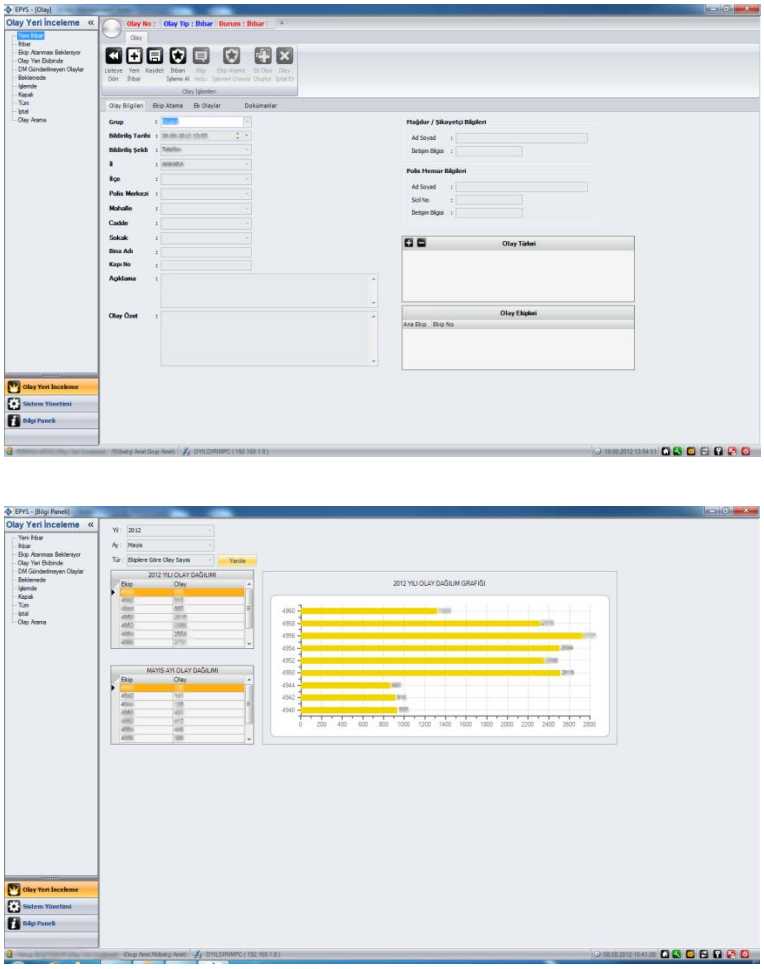
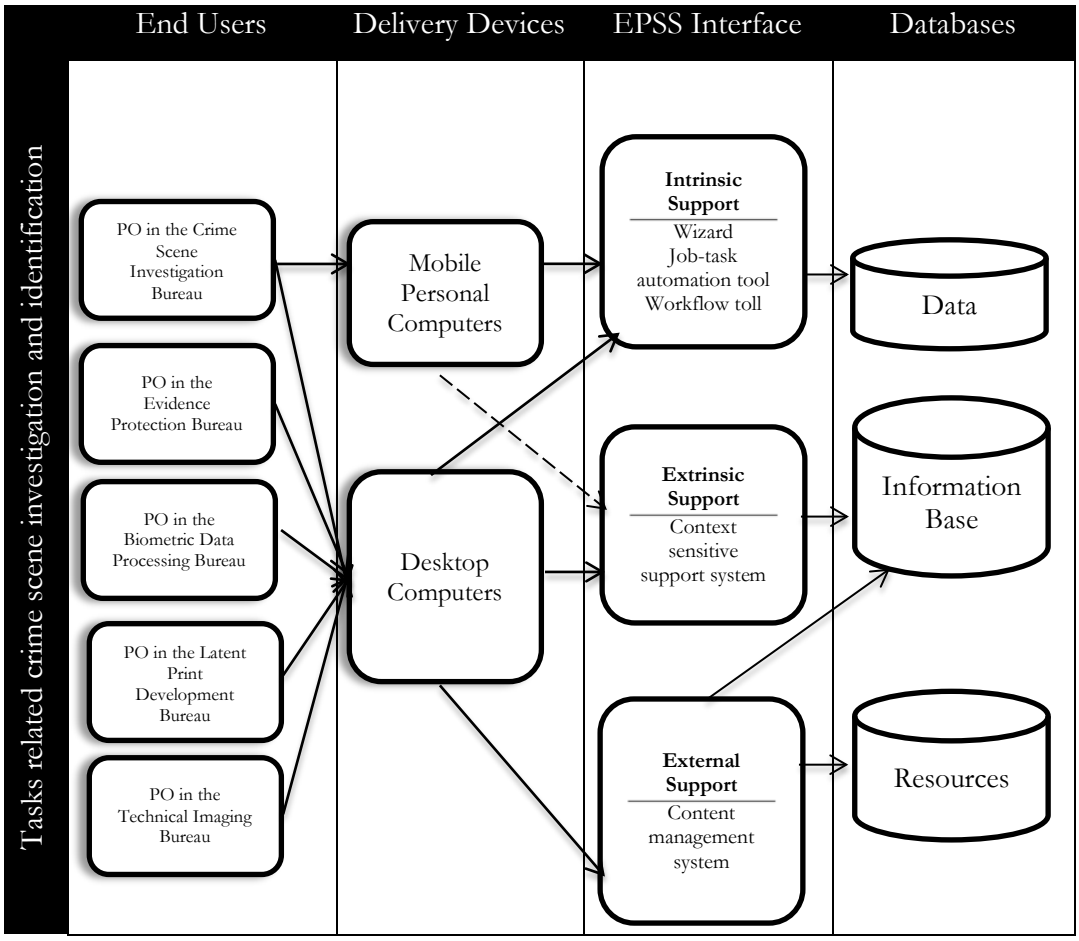


Figure 3.2 Screenshots from the software application

Information System and Network), which is an intranet system used by the Turkish National Police. Figure 3.3 illustrates the architecture of the EPSS, whose template is adapted from Nguyen and Woll (2006).

The EPSS involved three basic types of performance support system established by Gery (1995): intrinsic, extrinsic, and external supports. The following part describes each type of the performance support system involved in the EPSS.



Note. PO: Police officers

Figure 3.3 The Architecture of the EPSS Used in the Study

3.4.2.1. Intrinsic Performance Support System

The intrinsic performance support system consists of specific tools that structure the tasks, guide the police officers through the work, and automate the tasks. The intrinsic supports are inherent to the application software so the police officers do

not have to break the task to obtain a support. They are not aware of being supported while using the tools. The intrinsic performance support system provides the right type of supports which a performer needs while performing job-related tasks. The intrinsic performance support system includes three components: wizard, job-task automation tool, and workflow tool.

Wizard. The wizard provides step-by-step guidance for the police officers to prepare a crime scene investigation report. While the police officers are investigating a crime scene, the wizard prompts them for input, transforms data, and generates reports. In order to obtain the crime scene investigation report, they are only required to follow the steps and complete the fields while investigating a crime scene. It mainly provides action-oriented assistance. In this regard, the wizard is also designed to structure

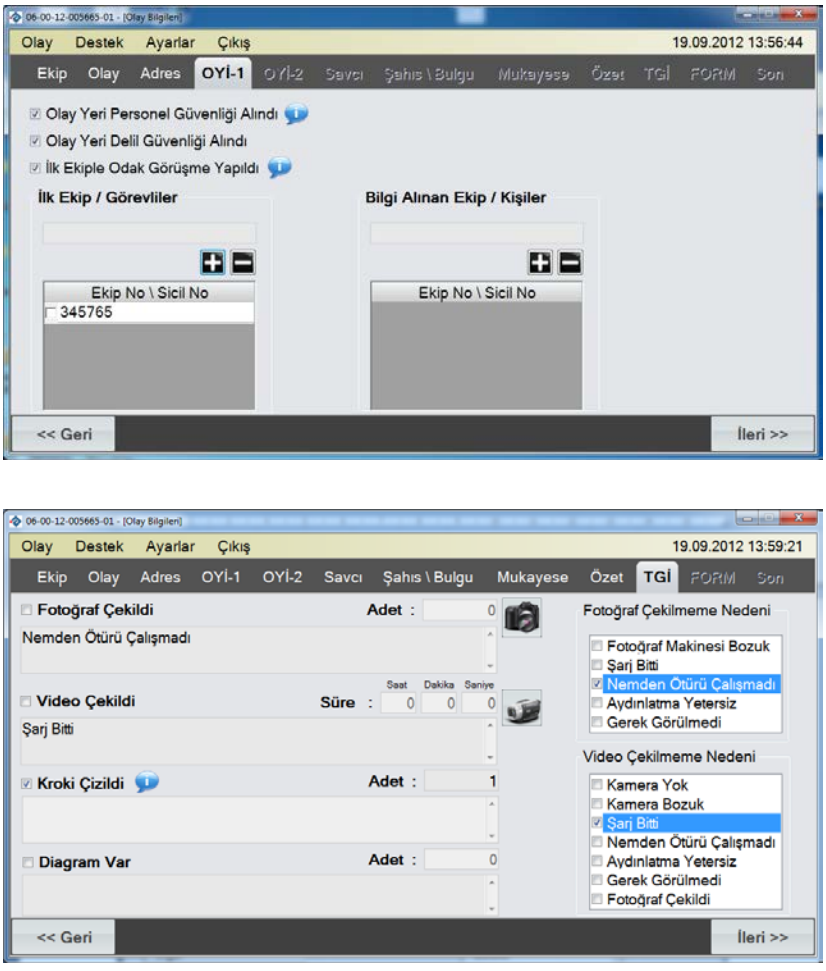


Figure 3.4 Screenshots from the wizard

process of a crime scene investigation to some extent. It leads the police officers to progress through an optimized sequence of tasks to complete a crime scene investigation. In this way, they are not allowed to skip any step necessary for an investigation. In other words, the wizard breaks the crime scene investigation task into a number of small steps, and guides the police officers through the steps. The wizard also warns the police officer of any mistakes in a crime scene investigation or data entry. In addition, the wizard includes links to the extrinsic support system that provides the police officers with information to support them in a crime scene investigation. Figure 3.4 illustrates screenshots from the wizard in the EPSS.

Job-task automation tool. The job-task automation tool automates the task of creating reports. In the Crime Scene Investigation and Identification Units, the

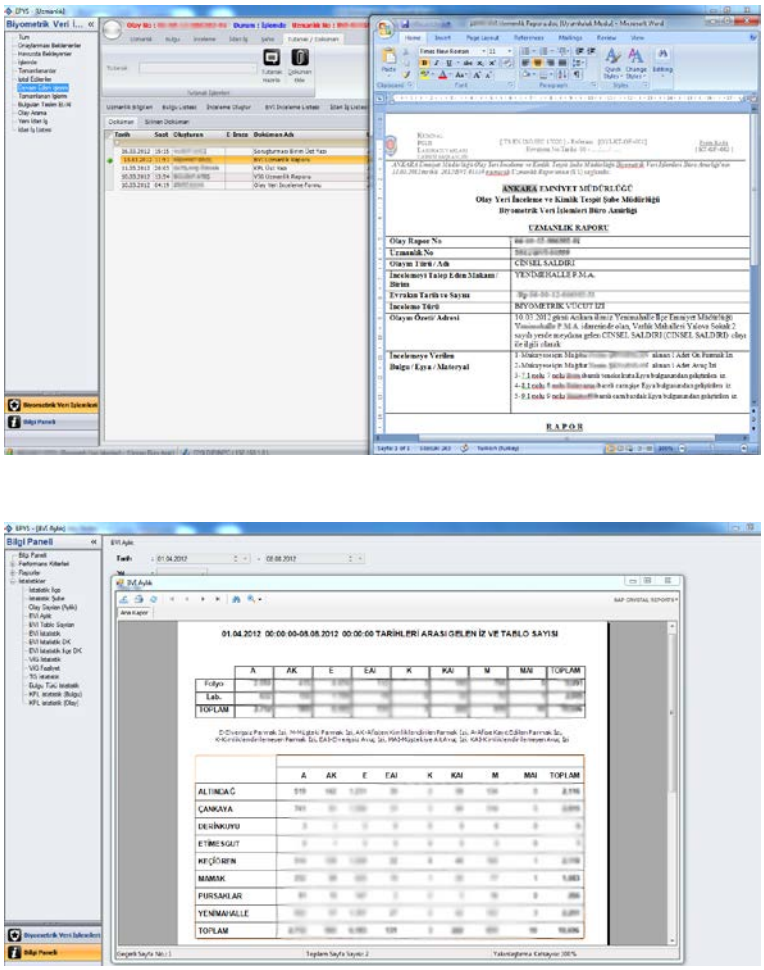


Figure 3.5 Screenshots from the job-task automation tool

bureaus are required to prepare an expertise report for each investigation on evidences. The job-task automation tool is designed to extract all of the relevant data from the database, transform them, and generate an expertise report automatically. The tool also allows the use of data across the bureaus in creating reports. If some of the data required for an expertise report are already available in the system, the tool uses them, rather than requesting redundant data entry. In addition, the job-task automation tool is able to automatically generate particular statistical reports on data. Figure 3.5 demonstrates screenshots from the job-task automation tool in the EPSS.

Workflow tool. The workflow tool enables the police officers to regulate and monitor the workflow from receiving a denouncement to closing the file in the units. On the basis of predefined rules, it allows the police officers to assign evidences to particular bureaus for investigations. Once the assignments are done, the tool notifies the police officers for evidences to investigate. The police officers accept evidences, perform investigations, and then identify the next step in the workflow through the tool. It also notifies the police officers of their mistakes regarding the assignment of evidences. The workflow tool also automates the task of creating a delivery receipt report that is prepared each time the police officers accept or deliver an evidence to investigate. Figure 3.6 illustrates screenshots from the workflow tool in the EPSS.

In addition to the tools explained above, the system also contains many features to support the police officers. Firstly, the system consists of tabbed pages designed to get the police officers to focus on only a particular aspect of the task at a time. Secondly, the system mostly contains graphical user interface controls which allow the police officers to input data by choosing from a list of existing options (e.g., combo-box, list-box, and filtered combo-box) rather than typing into fields. Lastly, based on the predefined rules, buttons become active or inactive to guide the police officers in the system. These design features provides cognitive support for the police officers.

While only the police officers in the Crime Scene Investigation Bureau had access to the wizard, those in the other bureaus had an opportunity to benefit from the other tools in the intrinsic performance support system. The mobile personal computers only run the wizard because they were used only in crime scene investigations.

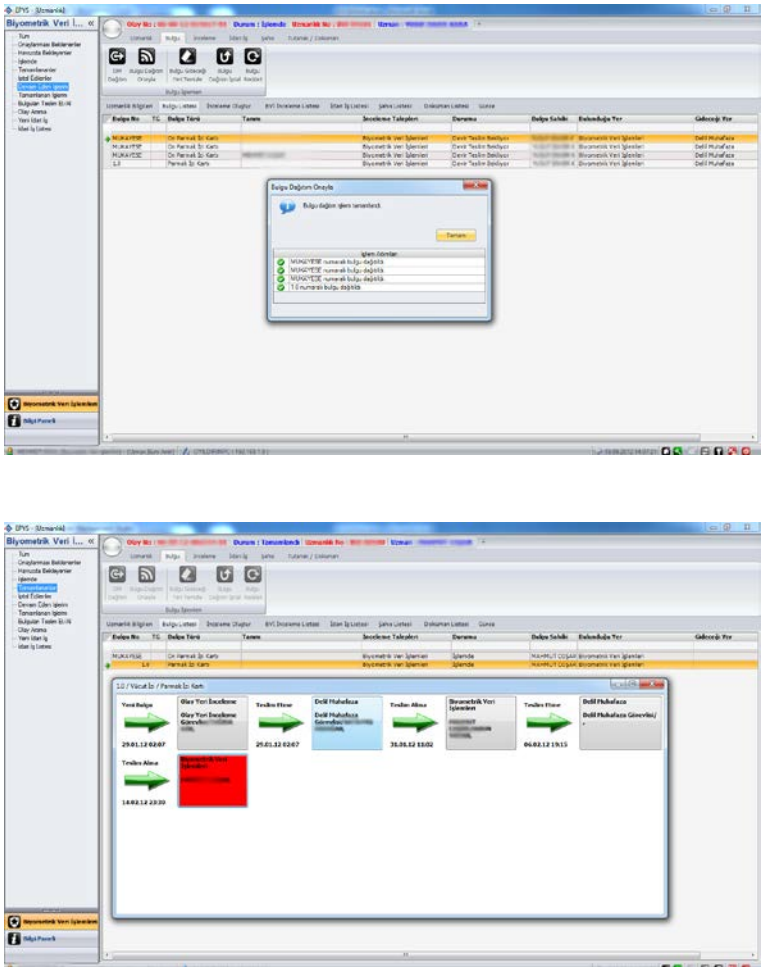


Figure 3.6 Screenshots from the workflow tool

3.4.2.2. Extrinsic Performance Support System

The extrinsic support system was a context-sensitive support system. When accessing this support, the police officers need to interrupt the actual performance, but remains the work environment. The support buttons in the form of an information mark are located throughout the application. When the police officers click these buttons, a pop-up window displays contextual support information associated with the tasks. Based on the type and complexity of the tasks, the performance support system presents support information in various structures while the police officers are performing them. The extrinsic support system provides on-demand access to the right type and amount of information in the right place.

The support information is presented in five basic support structures, including a cue card, guides, a checklist, tips, and frequently asked questions. The cue card includes a small set of information; the guides: steps to perform the tasks; the checklist: mini lists to check processes; the tip: hits and alerts for the tasks; and the frequently asked questions: answers to the most questioned issues. The extrinsic system also has a link to the external performance support system.

All bureaus in the Crime Scene Investigation and Identification Units have access to the extrinsic support system. However, the police officers can access only the guides in the Wizard because they are the most appropriate support structure for the tasks that they perform with the mobile devices. Figure 3.7 illustrates screenshots from the extrinsic performance support system.

3.4.2.3. External Performance Support System

The external support in this study was a content management system (Figure 3.8).

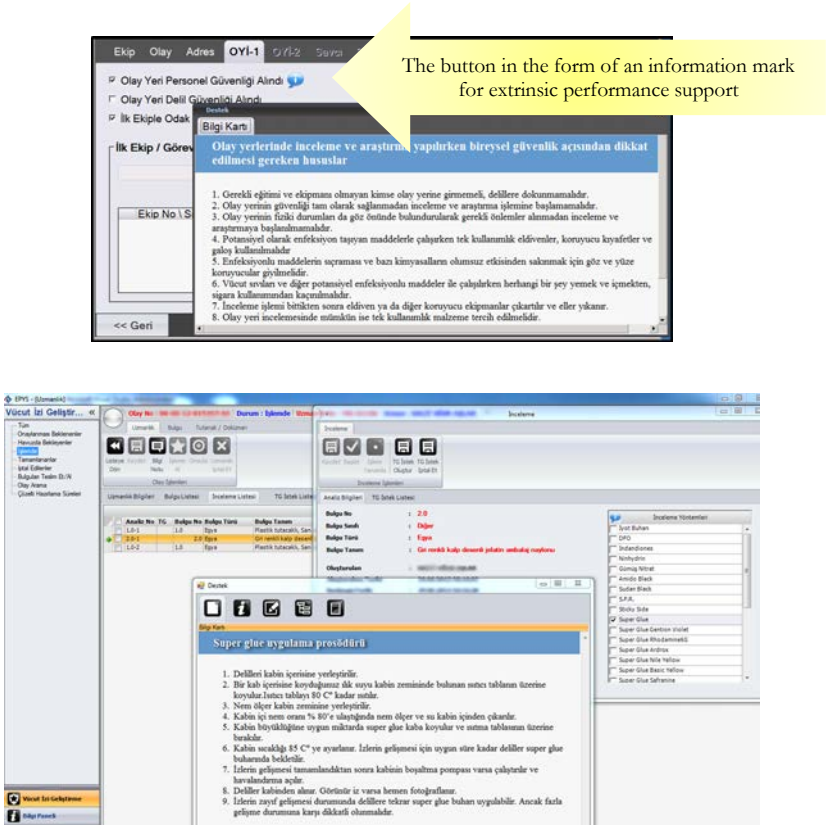


Figure 3.7 Screenshots of the extrinsic performance support system

The police officers need to leave the work context completely to access the external support. When they click the support button in the quick launch bar of the system, or in the extrinsic support popup window, a new window are opened and prompts them to submit a keyword or select the relevant performance criteria from the given list. Based on the query, the system searches and presents all relevant resources in the system repository. The police officers have to choose resources that corresponds to their needs. In addition to basic search, the system also offers an advanced search tool. Therefore, the external performance support system involves on-demand access to the content management system in which the police officers manually locate the relevant information.

In this system, the resources consist of training documents as well as support information in the structure of a cue card, images, tips, guides, a wizard, process maps, and frequently asked questions. In the system, availability of the resources depends on the scope of the content that the department of Criminal Police Laboratories provided during the system design. All bureaus in the Crime Scene Investigation and Identification Unit have access to the external support system through computers in the offices.

3.5. Participants of the Study

Based on the time orientation (i.e., concurrent vs. sequential) and sample

Figure 3.8 A Screenshot of the external performance support system

relationships between quantitative and qualitative phases of the study, Onwuegbuzie and Collins (2007) propose a two-dimensional mixed methods sampling model. The criterion of time orientation is related to whether quantitative and qualitative phases of the study are conducted concurrently or sequentially. After the researcher has decided the time orientation, he or she selects a mixed methods sampling design. It falls into four categories: (1) identical, (2) parallel, (3) nested, and (4) multilevel.

As discussed in the design of the study, quantitative and qualitative phases of the study were conducted concurrently. In the present study, the relationship of the quantitative and qualitative samples was nested. A nested relationship means that the sample selected for one component of the study is a subset of participants in the other components of the study. Figure 3.9 demonstrates the sampling design of the study.

In the study, the police officers in the Crime Scene Investigation and Identification Units in six provinces of Turkey (i.e., Ankara, Antalya, Balıkesir, Bursa, Isparta and Kırıkale) were accessible for the researcher. This selection was based on the judgment strategically and purposively made by the Department of Criminal Police Laboratories of the Turkish National Police. This judgment relied on the data of 2007 related to work load, the number of police officers, information technology awareness, and information technology infrastructure to reflect the general nature of

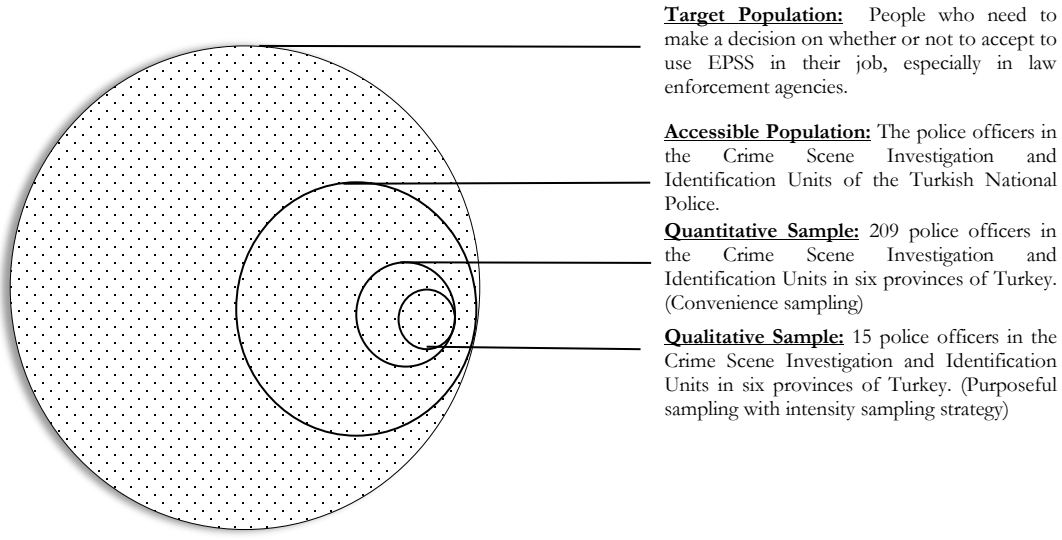


Figure 3.9 The sampling design of the study

the Crime Scene Investigation and Identification Units in Turkey.

In the present study, the Crime Scene Investigation Units in three of six provinces (i.e., Ankara, Antalya, and Bursa) represented the big provinces with high workload, high number of employees, high information technology awareness, and high information technology infrastructure. On the other hand, the others (i.e., Balıkesir, Isparta, and Kırıkkale) represented the small provinces with low workload, low number of employees, high information technology awareness, and average information technology infrastructure.

In the quantitative phase of the study, a convenience sampling method was used to select the participants. According to this method, a researcher selects participants on the basis of their willingness and availability for the study (Creswell, 2012). Especially, when a random or a systematic sampling is not feasible, researchers may prefer to use convenience sampling for studies (Fraenkel et al., 2012)

Based on the convenience sampling method, 209 police officers in the Crime Scene Investigation and Identification Units in six provinces of Turkey (i.e., Ankara, Antalya, Balıkesir, Bursa, Isparta and Kırıkale) participated in the study. The participants were from the five bureaus of the Crime Scene Investigation Units: (1) Crime Scene Investigation Bureau, (2) Evidence Preservation Bureau, (3) Biometric Data Processing Bureau, (4) Latent Print Development Bureau, and (5) Technical Imaging Bureau. The Crime Scene Investigation and Identification Units in two of six provinces (i.e., Isparta and Kırıkkale) did not have the Latent Print Development Bureau. Table 3.4 shows the distribution of the participants by the provinces.

An independent sample t-test was conducted to ensure that the police officers in the big provinces (Group A) and those in the small provinces (Group B) came from the same population. There was no significant difference between the two groups in the scores on the measure of the study, t (207) = -.802, p = .42, indicating they came from the same population (Table 3.5). Moreover, the Levene's test for equality of variances showed that the variance in the groups did not significantly differ from each other.

Table 3.4

The Distribution of the Participants by the Provinces

	n	%
Provinces		
Ankara	59	28.23
Antalya	44	21.05
Balıkesir	23	11.00
Bursa	62	29.67
Isparta	13	6.22
Kırıkkale	8	3.83

Note. $n = 209$

In the qualitative phase of the study, purposeful sampling with an intensity sampling strategy was applied to select information-rich, not highly unusual, police officers to gain insight and in-depth understanding about their perceptions regarding the usefulness and ease of use of the EPSS and facilitating conditions for the acceptance of the EPSS. The intensity sampling strategy seeks information rich cases to understand the phenomenon of interest in an intensive, not extreme, way (Patton, 2002). However, this sampling requires researchers to have some prior knowledge and make thoughtful judgment in selecting cases.

Based on intensity sampling, a total of 15 police officers were selected. The selection of the interviewees rested on participant observation and cooperation with the key informants (i.e., police captain, police major, or trainers of the system) in order to reach the police officers who had a considerable experience with the EPSS, comprehended its features and capabilities well, and were interested in using it. They were also the participants of the quantitative phase of the study. Table 3.6 shows the distribution of the interviewees by gender, provinces, and the bureau where they were employed.

Table 3.5

Homogeneity Test of the Crime Scene Investigation Units in the Big and Small Providences

	Group A		Group B			
	M	SD	M	SD	df	t
Scores on the measure of the study	5.85	1.05	5.99	.94	207	-.802

$^{*}p < .05$. $^{**}p < .01$.

Table 3.6

The Distribution of the Interviewees by Gender, Provinces, and the Bureau

	n	%
Gender		
Male	15	100
Female	-	-
Provinces		
Ankara	3	20.0
Antalya	3	20.0
Balıkesir	2	13.3
Bursa	3	20.0
Isparta	1	6.7
Kırıkkale	3	20.0
Bureau		
Crime Scene Investigation Bureau	7	46.7
Evidence Preservation Bureau	1	6.7
Biometric Data Processing Bureau	3	20.0
Latent Print Development Bureau	2	13.3
Technical Imaging Bureau	1	6.7

Note. $n = 15$

3.6. Instrumentation

In this study, the data were collected through a questionnaire and interviews. In the following part, design and development process of the instruments are explained.

3.6.1. The Questionnaire

In the quantitative phase of the study, a questionnaire was developed by the researcher in order to examine user acceptance of the EPSS. All items of the questionnaire were adapted from the previous studies to measure TAM constructs (i.e., perceived usefulness, perceived ease of use, attitude toward using, and behavioral intention to use). The questionnaire was also tailored to be more suitable for the police officers.

Perceived usefulness (PU) and perceived ease of use (PEU) were operationalized by using the items adapted from Davis (1989). Six items on 7-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree) were taken and adapted to measure each construct. The middle point of the scale was stated as "Neither disagree nor agree". Davis reported reliability as .97 for PU and .91 for PEU, indicating very high reliability.

The items about attitude toward using (A) were adapted from the study by Taylor and Todd (1995a). Four semantic differential items were adapted to measure users' attitude toward using the EPSS. In these items, the participants were asked to mark between several pairs of adjectives to indicate their attitudes. Taylor and Todd reported reliability of this scale as .85, indicating very good internal consistency for the scale.

Behavioral intention to use (BI) was measured using three items adapted from Venkatesh and Bala (2008). They originally consist of two Likert-type items and one short-answer item. In this study, however, the short-answer item ("I plan to use the system in the next <n> months") was transformed into the Likert-type item. Seven-point Likert-type scale, with 1 equaling "strongly disagree" and 7 equaling "strongly agree", was used in these items. Venkatesh and Bala reported internal consistency of these items as .88, indicating very high reliability.

The questionnaire was developed in Turkish language. Therefore, the back translation method (Brislin, 1980) was utilized in translating items from the source language (i.e., English) to the target language (i.e., Turkish) in order to ensure equivalence of items. This process involved four basic steps (Figure 3.10).

Step1. The researcher translated the items in English (IE1) into Turkish (IT1). One English linguistic expert and two bilingual experts in the field of instructional technology checked the quality of the translation independently. Based on their critical feedback, some translated item were rephrased in Turkish.

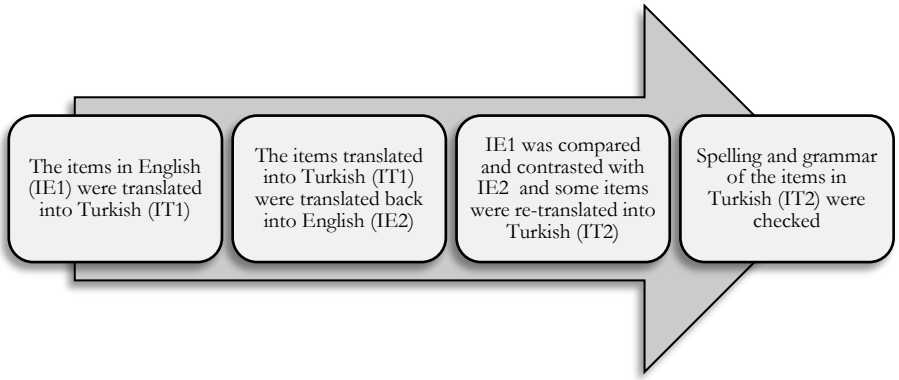


Figure 3.10 The back translation method used in the study

Step2. The expert in the field of English linguistic and instructional technology independently translated the items into Turkish (IT1) back into English (IE2).

Step3. The researcher and two bilingual experts in the field of instructional technology independently compared and contrasted IE1 with IE2. On the basis of differences between IE1 and IE2, some items were re-translated into Turkish (IT2) and then back translated into English to have confidence in the quality of the translation.

Step4. One expert in Turkish language checked spelling and grammar of the items in Turkish.

The questionnaire consists of four main sections. It begins with the introduction section that provides the participants with information about the purpose of the study, importance of the results, confidentiality, structure of the questionnaire, and time to complete the questionnaire. The second section of the questionnaire involves 15 items on a seven-point Likert-type scale that measures the police officers' PU (6 items), PEU (6 items), and BI (3 items) for the EPSS. For each item, the participants are asked to choose a scale point that the most accurately describes their thoughts. The third section of the questionnaire includes 4 semantic differential items that measure the police officers' attitude toward using the EPSS in their jobs. The last section of the questionnaire consists of the items to collect the demographics (i.e., gender, rank, age, education level, and intensity of job-related use of the EPSS). Each section also has an instruction part about how to respond to the items in an appropriate way. In addition, the informed consent form is enclosed with the questionnaire.

Three experts and police officers in the Department of Criminal Police Laboratories of the Turkish National Police reviewed the questionnaire. Two experts in the field of instructional technology independently gave some feedback that resulted in minor changes in the questionnaire with respect to appropriateness of the questionnaire format and clarity of the instructions. Moreover, one measurement and evaluation expert gave feedback on the format of the questionnaire, and wording and adequacy of the items. Furthermore, two police officers in the Department of Criminal Police Laboratories of the Turkish National Police found content and language of the items

as appropriate for their context. However, they gave some critical feedbacks about the items related to demographic information that may preclude anonymity of the participants. As a result, the researcher cautiously evaluated this feedback and some revisions were made in the questionnaire as follows:

- The font styles of some words and sentences in the questionnaire were changed or checked.
- Some changes were made to the instructions in some sections of the questionnaire to improve their clarity.
- The demographic question about the rank of the respondents was removed. After the pilot study, the demographic question about the years of experience in the job was added into the questionnaire.

3.6.1.1. The Pilot Study

Before the actual study, a pilot study was conducted to gain confidence in the construct validity and reliability of the scales that were translated into Turkish. Moreover, this pilot study helped the researcher to prevent potential practical problems in the research process.

The pilot study was carried out during an in-service training program organized by the Department of Criminal Police Laboratories of the Turkish National Police. The participants of this study consisted of the police officers in the Crime Scene Investigation and Identification Units in the 81 provinces of Turkey who attended the in-service training program. In this respect, it was expected that the participants would show considerable similarity to those in the main study.

The pilot study focused on the police officers' acceptance of computer systems in their jobs. The reasons why the focus of the pilot study was on acceptance of computers were because (1) the EPSS is a computer-based system, (2) computers are common tools which the participants use in their jobs, and (3) the participants are likely to have a considerable perception about the use of computers in their jobs.

The pilot study used data from 149 police officers (145 male, 4 female) who attended the in-service training program. Of the participants, 7.4% were between the ages of

20-30, 68.5% were between the ages of 31-40, and 24.2% were between the ages of 41-50. With respect to education level, 10.1% of the participants graduated from high schools, 55.7% held an associate degree, 31.5% had bachelor's degree, and 2.7% held master's degree. Moreover, more than half of the participants (66.4%) had heavy job related use of the computers. The demographic characteristics of the participants are summarized in Table 3.7.

The researcher administered the questionnaire at the end of a session of the in-service training program. Before the administration of the questionnaire, the researcher explained details of the study and answered some questions that the police officers had about the study and the questionnaire. In order to administer the questionnaire, official permission was taken from the Department of Criminal Police Laboratories of the Turkish National Police.

The construct validity of the questionnaire was examined using factor analysis, "a statistical procedure that analyses correlations among test items and tells you the number of factors present" (Johnson & Christensen, 2012, p. 146). A factor analysis using maximum likelihood factor extraction with direct oblimin rotation was performed on 19 items. Before running the analysis, the preliminary assessment was

Table 3.7

The Demographic Characteristics of the Participants of the Pilot Study

Characteristic	n	%
Gender		
Male	144	96.6
Female	4	2.7
Age (years)		
20-30	11	7.4
21-40	102	68.5
41-50	36	24.2
Highest education level completed		
High school	15	10.1
Associate degree	83	55.7
Bachelor's degree	47	31.5
Master's degree	4	2.7
The intensity of job-related use of computer		
Light	6	4.0
Neither light or heavy	44	29.7
Heavy	89	66.4

Note. $n = 149$

performed to ensure suitability of the data for a factor analysis. The data held a minimum of 7 observations per variable, supporting the desired ratio of number of observations per variable (5:1) (Hair, Black, Babin, Anderson, & Tatham, 2006). The examination of the correlation matrix revealed many correlation coefficients of .3 and above, contributing to the factorability of the data. Barlett's test of sphericity, χ^2 (171) = 1653.19, $p < .001$, also illustrated that the relationships between the items were large enough for a factor analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) value was also found as .85, exceeding the suggested value of .6 (Tabachnick & Fidell, 2007). In addition, all KMO values for individual items were greater than .71, more than the minimum acceptable value of .5 (Field, 2009).

Based on Kaiser's criterion, the analysis retained four factors with eigenvalues over 1. An examination of scree plot also justified extracting four factors in the analysis due to inflexion in the curve after the fourth factor. Therefore, it was decided to retain four factors in the analysis, explaining 56.94% of variance.

Based on the results of the analysis, the researcher made some revisions in the scales. One item related to perceived usefulness (PU4) and two items related to perceived ease of use (PEU3 and PEU4) were removed because of not having high loading on the factors (below ±.40). Although one item related to intention to use (IU1) did not have high enough loading onto the factor (.37), it was retained because of having a quite higher loading than the cross loading and the loading close to a threshold value of ±.40. Table 3.8 shows the factor loadings of the items after direct oblimin rotation and Kaiser Normalization.

The items on factor 1 represent "perceived usefulness", those on factor 2 "perceived ease of use", those on factor 3 "attitude toward using", and those on factor 4 "behavioral intention to use". Table 3.9 illustrates the correlation coefficients between the factors.

The internal consistency of these four scales was tested using Cronbach's alpha coefficient, α. The reliability of the scales ranged from .64 to .91. The "perceived usefulness", "perceived ease of use", and "attitude toward using" scales had high reliabilities, .91, .83, and .88 respectively. The reliability of the "behavioral intention

Table 3.8

Summary of a Factor Analysis Using Maximum Likelihood Factor Extraction with Direct Oblimin Rotation

	Factors			
Item	1	2	3	4
PU1	.98			
PU3	.95			
PU2	.77			
PU6	.70			
PU5	.51			
PEU6		.82		
PEU1		.75		
PEU5		.72		
PEU2		.57		
A2			.97	
A1			.97	
A3			.70	
A4			.63	
IU4				.78
IU2				.53
IU1				.37

Note. $n = 149$

All cross-loadings were below .40. Factor 1 = Perceived Usefulness; Factor 2 = Perceived Ease of Use; Factor 3 = Attitude toward Using; Factor 4 = Behavioral Intention to Use

to use" scale was not satisfactorily high, Cronbach's alpha = .64. Because the value of the Cronbach's alpha is sensitive to the number of items on scales, it is more likely to find low Cronbach's alpha values for short scales (Field, 2009). The "behavioral intention to use" scale had three items therefore Cronbach's alpha was more likely to be small for the scale. The mean inter-item correlation for the items on the "behavioral intention to use" subscale was .40. The reliability of the total scale items is high, Cronbach's alpha = .88. Cronbach's alpha coefficients of the scales are presented in Table 3.10.

In the pilot study, the respondents gave some feedback on the wording, instructions, and items of the questionnaire. In addition, the expert in the field of instructional technology suggested adding a demographic question about years of experience on the job to the questionnaire. The final form of the questionnaire consisted of 21 questions, including 12 items on 7-point Likert-type scale, 4 semantic differential items, and 5 demographic questions (Appendix C). Because Davis and Venkatesh (1996) did not found a significant difference between item grouping and item

Table 3.9

Correlations between the Factors

Factor	1	2	3	4
1. PU	–			
2. PEU	.34	–		
3. A	.29	36	–	
4. BI	.32	.51	.41	–

Note. PU = Perceived Usefulness; PEU = Perceived Ease of Use; A = Attitude toward Using; BI = Behavioral Intention to use.

intermixing in terms of reliability and validity of TAM scales and path coefficients, the grouped format was used for TAM measures in the questionnaire.

3.6.2. Interview Guide

An interview guide outlines key questions, topics, or issues to be investigated in interviews (McMillan & Schumacher, 1997; Patton, 2002). During the course of interviews, researchers make a commitment on sequence and wording of interview questions. However, based on the importance of the order of the questions and issues, the interview guide can be developed in a more or less detailed way (Patton, 2002). The general interview guide approach helps in making interviews more systematic, comprehensive, and conversational.

In this study, the interview guide assisted the researcher in gathering the police officers' perceptions, thoughts, and experiences regarding the acceptance of the EPSS. It includes three sections: introduction, questions, and closing.

a. Introduction. This section guided the researcher to explain the purpose of the study, the importance of the interviewees, how the results would be used, the

Table 3.10

Cronbach's Alpha Coefficients of the Scales in the Pilot Study

	Number of Items	Cronbach's Alpha
Perceived Usefulness	5	.91
Perceived Ease of Use	4	.83
Attitude toward Using	4	.88
Behavioral Intention to Use	3	.64

confidentiality of the identity of the interviewees, and the time that the interview would take. It also includes a reminder to ask the interviewee for permission to use a recorder device during the interview.

b. Questions. This section includes six open-ended questions. The first question of the interview guide is about the police officers' general opinions related to the use of the EPSS in their jobs. This question helped the police officers to be relaxed and motivated for interviews. The following questions in the interview guide are more focused on the research questions of the study. They consist of the questions on the police officers' perceptions, thoughts, and experiences regarding the usefulness of the EPSS, the factors that they consider for usefulness and ease of use of the EPSS, and conditions that facilitate EPSS use. Moreover, the interview guide includes probes that deepen the responses given by the police officers.

c. Closing. This section reminded the researcher to thank the interviewees for their participation and ask if there was anything else which they would like to add regarding the use of the EPSS in their job.

Two experts in the field of instructional technology independently reviewed the interview guide. Based on their feedback, the interview questions were revised to improve clarity of the interview questions. Moreover, the interview guide was reviewed by one police officer in the Department of Criminal Police Laboratories of the Turkish National Police. His feedback was useful in recognizing how the police officers might understand and respond to the interview questions. The interview guide is present in Appendix D.

3.7. The Researcher's Role

In especially qualitative research, it is essential to understand the role of the researcher because he or she is the main instrument that gathers qualitative data (Marshall & Rossman, 2006; Patton, 2002). In qualitative inquiries, the researcher is close to people or settings therefore he or she may have a profound effect on them. The intended role of the researcher is to encourage the respondents to talk in a conversation style and to share their implicit feelings, ideas, experiences, and perceptions (Bogdan & Biklen, 2007). However, it is important to disclose any

information or issues that may have an impact on data collection, analysis, and interpretation of the research.

In this study, the role of the researcher had an outsider status. The researcher was a member of the research team that carried out analysis, design, development, and implementation phases of the EPSS. During the development process of the EPSS, he gained considerable experience with the workflow and culture of the police officers in the Crime Scene Investigation and Identification Units. In addition, he made several contributions to design decisions of the system. In implementation phase of the EPSS, he gave some police officers in-service training on how to use the EPSS in their job.

3.8. Data Collection Procedures

The researcher applied to the Middle East Technical University Human Subjects Ethics Committee (HSEC) to obtain an approval for this study. The description of the research procedures, the informed consent forms, and the instruments used in the study (i.e., the questionnaire and the interview guide) were presented to the ethics committee. HSEC approved that this study guarantees the protections of the participants (Appendix B).

Before collecting data, the researcher took official permission from the Department of Criminal Police Laboratories of the Turkish National Police through a formal letter. The official permission document is given in Appendix A. After obtaining permission for the study, the researcher asked the Department of Criminal Police Laboratories of the Turkish National Police to inform the Crime Scene Investigation and Identification Units in six provinces of Turkey about the purpose of the study and the procedures followed in the study. In addition to official permission, the researcher also obtained verbal permission from the chief of each Crime Scene Investigation and Identification Unit before collecting the data.

3.8.1. Quantitative Data Collection Procedures

In the quantitative phase of the study, the questionnaire was administered after in-service training on the use of the EPSS. This training was offered in each Crime

Scene Investigation and Identification Unit at different times. The police officers in each bureau took instructions on how to use the EPSS in their own work practices. The majority of the police officers also had the opportunity to have hands-on experience with the EPSS during the training.

In the Crime Scene Investigation and Identification Units in four provinces (i.e., Antalya, Bursa, Isparta, and Kirikkale), the questionnaire was handed out individually to the police officers by the researcher. In other provinces (i.e., Ankara and Balikesir), the questionnaire was administrated by the trainers who were well instructed in how to administer it.

During the quantitative data collection in each site, first of all, the chief of the Crime Scene Investigation and Identification Unit or the commander of each bureau introduced the researcher or the trainers to the police officers. After the in-service training, the researchers or the trainers briefly explained the purpose of the study and underlined the confidentiality of the identity of the participants. In addition, the police officers were sincerely notified that participation was voluntary and there would not be any negative consequences if they did not agree to participate in the study. Thereafter, the questionnaire was handed out individually to the police officers. The return of filled questionnaires implied consent of the police officers. Moreover, any concerns related to the questionnaire were cleared during the administration of the questionnaire.

3.8.2. Qualitative Data Collection Procedures

In the qualitative phase of the study, the researcher conducted all one-on-one interviews after the interviewees were identified in each Crime Scene Investigation and Identification Unit. When meeting with the interviewees for the first time, the researcher briefly introduced himself and answered their questions about the study. Acceptance of the interview implied consent of the police officers. Then, the researcher and the participants set a time and a place for the interviews. The interviews were conducted in places free from distractions (e.g., empty office) within working hours of the participants. Before the interviews, the researcher tried to spend a considerable amount of time with the participants in order to establish trust and a rapport with them.

At the beginning of the interviews, the researcher clearly informed the police officers about the purpose of the study, the importance of their participation, the potential benefit of the results, and the time the interview would take. Then, he phrased his request to use a recording device during the interview. All except one police officer approved of recording the interview. One police officer refused it due to the fact that he felt uncomfortable. During this interview, the researcher took notes of what the police officer said. Before beginning the interviews, the researcher was certain that the interviewees did not have any concerns about the confidentiality of their identities.

During the interviews, the researcher decided on the wording of the questions and mainly asked them in the same order. While asking the questions, the researcher was careful that the wording of the questions was open-ended, natural, clear, non-dichotomous, non-leading, and singular. After asking the questions, the researcher attentively listened to the police officers and did not interrupt their talking. He also used verbal and non-verbal probes, when necessary, to encourage the police officers to give more in-depth and detailed responses to the questions. In addition to recording the interviews, the researcher also took some notes on the gestures of the interviewees. The interviews took between 20 and 50 minutes.

After the interviews, the researchers reviewed the interview notes for clarity and certainty. At the end of each interview, the researcher also evaluated the process of the interview and decided what he could do in the next interview by himself.

3.9. Analysis of the Data

The following two sections explain procedures followed in the analysis of the quantitative and qualitative data.

3.9.1. The Analysis of the Quantitative Data

In the analysis of the quantitative data, descriptive statistics, internal consistency reliabilities, and the Structural Equation Modeling (SEM) were used. The statistical tools utilized to conduct the aforementioned analyses were the Statistical Package for

the Social Sciences (SPSS) 18.0 and the Analysis of Moment Structures (AMOS) 18.0. While AMOS was used for SEM, SPSS was used for the other statistical tests.

3.9.1.1. Descriptive Statistics

Descriptive statistics were used to organize and summarize the demographics and the participants' responses to each item in the scales. The frequency distributions were used to show the number and percentage of the participants in each category of the demographic variables. Moreover, mean and standard deviation values were calculated to summarize the continuous demographic variables such as age and years of experience in the job. In addition, mean and standard deviation values of the participants' responses to each item in the scales were presented.

3.9.1.2. Internal Consistency of the Scales

Internal consistencies of the scales were assessed using Cronbach's Coefficient alpha, α. The general rule of thumb is that an acceptable value for Cronbach's Coefficient alpha is .70 to .80 (Field, 2009; Hair et al., 2006).

3.9.1.3. The Structural Equation Modeling (SEM)

SEM examined the validity of the relationships hypothesized by TAM. SEM is a "multivariate technique combining aspects of factor analysis and multiple regression that enables the researcher to simultaneously examine a series of interrelated dependence relationship among the measured variables and latent constructs (varieties) as well as between several latent constructs" (Hair et al., 2006, p. 710). SEM consists of two sub-models: the measurement model and the structural model. While the measurement model focuses on the relationships of the measured (observed) variables with latent constructs, the structural model emphasizes relationships between latent constructs offered by a theory (Tabachnick & Fidell, 2007). SEM indicates the extent to which sample data supports the theoretical model (Schumacker & Lomax, 2004).

A theory forms the foundation of SEM analysis because it specifies a set of relationships that SEM tests and potentially confirms. In this study, SEM examined the relationships specified by TAM. It involved four latent constructs: perceived

usefulness, perceived ease of use, attitude toward using, and behavioral intention to use.

In this study, the type of data used for the observed variables were continuous interval. The estimation of SEM parameters was based on covariance matrix. Comparing with correlation matrix, covariance matrix makes researchers more flexible, especially in terms of statistical operations (Hair et al., 2006). Also, maximum likelihood and generalized least squares, which are mostly used structural equation models, are based on covariance matrices rather than correlation matrices (Dilalla, 2000).

3.9.1.3.1. Model Testing Procedures

In this study, SEM analysis was consistent with the two-stage approach. In this approach, the structural model is assessed following the measurement model (Hair et al., 2006; Kline, 2011). According to Byrne (2010), it is important to test the measurement model before the structural model because the validity of the observed variables makes a considerable contribution to the validity of the findings associated with the structural model.

The measurement model was assessed through confirmatory factor analysis (CFA). CFA examined how well the observed variables represented the constructs of TAM (i.e., latent variables). The validity of the measurement model was based on acceptable overall model fit. After the measurement model was validated, the structural model was assessed in order to examine a set of relationships specified by TAM. As noted by Hair et al. (2006), the validity of the structural model is based on (a) overall model fit and (b) structural parameter estimates. Accordingly, the structural model was supported when the model had a good fit and the hypothesized relationships were significant. Furthermore, the mediation effect was examined through direct and indirect effects of the latent variables. Prior to assessing these models, a series of preliminary analyses were conducted to examine underlying assumptions.

3.9.1.3.2. Preliminary Analyses

The preliminary analyses were conducted to test underlying assumptions of SEM analysis, including sample size, missing data, multivariate outliers, multivariate normality, and multicollinearity.

a. Sample size

SEM analysis is quite sensitive to sample size. However, a clear-cut rule does not exist for sample size in SEM analysis (Dilalla, 2000). MacCallum, Widaman, Zang, and Hong (1999) argued that the level of communality of the variables and the level of overdetermination of the factors play a critical role in necessary sample size in factor analysis. Under conditions of high communalities (greater than .6) and overdeterminated factors (three or seven indicators per factor and a rather small number of factors), the small sample size (probably well below 100) may be sufficient to obtain a proper solution. Moreover, Hair et al. (2006) indicates that required sample size for SEM depends on multivariate normality of the data, estimation techniques, number of measured variables per constructs, indicators missing data, and item communality. According to them, if the SEM model consists of five or fewer factors, each with three or more indicators, and with high item communality (.5 or higher), 100 to 150 is the minimum sample size sufficient to run the model. Furthermore, Kline (2011) notes that the sample size typically used in SEM studies is about 200.

b. Missing data

Handling missing data is an important issue in SEM analysis because of its serious effect on results. According to Hair et al. (2006), based on the extent and pattern of missing data, four basic models can be applied to treat missing data problems: (a) the complete case approach, (b) the all-available approach, (c) imputation techniques, and (d) model-based approaches. The rule of thumb offered by Hair et al. (2006) suggests that if variable have missing data below 10%, any imputation method can be applied to solve the missing data problem.

c. Multivariate outliers

Outliers are cases that stand out as obviously different (extreme or atypical) from other cases. Tabachnick and Fidell (2007) states that univariate outliers are cases which have an extreme value on one variable while multivariate outliers are cases which have an unusual combination of scores on two or more variables. In this study, the squared Mahalanobis distance (D^2) value was referred to detect multivariate outliers for each case. Mahalanobis distance is defined as "the distance of a case from the centroid of the remaining cases where the centroid is the point created at the intersection of the means of all the variables" (Tabachnick & Fidell, 2007, p. 74). According to Byrne (2010), an outlier is a case with a D^2 value that is distinctly different from all other D^2 value.

d. Multivariate normality

SEM requires multivariate normally distributed data, which refer to a normal distribution of the combination of two or more variables (Hair et al., 2006). Most of the estimation methods used in SEM rely on the multivariate normality assumption. A violation of the multivariate normality assumption tends to impact on Chi-square (χ^2) goodness-of-fit statistics and standard errors of parameter estimates (Gao, Mokhtarian, & Johnston, 2008; West, Finch, & Curran, 1995).

This assumption involves a test of univariate normality for each observed variable as well as multivariate normality. Univariate normality is tested using two components of normality: skewness and kurtosis. Although there are conservative rules for values of univariate skewness and kurtosis, Kline (2011) suggests that the absolute value of skew index greater than 3 or the absolute value of kurtosis index greater than 10 suggests a severe departure from the univariate normality.

However, univariate normality does not guarantee that the multivariate distribution is normal (West et al., 1995). Therefore, Mardia's normalized estimate of multivariate kurtosis is evaluated to examine multivariate normality. The Mardia's normalized multivariate kurtosis value less than $p\ (p + 2)$, where p equals to the number of observed variables in the model, is indicative of multivariate normality (Raykov & Marcoulides, 2008).

However, Kline (2011) notes that tests to investigate multivariate normality (e.g., Mardia's test, Cox–Small test) are of limited use because small departures from the normality could result in statistical significance in a large sample. Kline suggests a test of univariate normality to assess multivariate normality. The assumption of multivariate normality is more likely to be satisfied if all variables have normal distributions (Tabachnick & Fidell, 2007).

It is also important to consider sample size to detect the extent to which a departure from normality makes a substantive difference in the analysis. Hair et al. (2006) asserts that sufficient sample size minimizes an impact of sampling error on data. The larger the sample size becomes, the less detrimental effect non-normality has on the results of the analysis. Tabachnick and Fidell (2007) note that in a large sample (i.e., 200 or more), variables with statistically significant skewness and kurtosis do not depart from normality so much as to have impact on the analysis.

e. Multi-collinearity

When separate variables are highly correlated (above .90), multi-collinearity deserves attention (Kline, 2011). The absence of multi-collinearity is assumed in SEM analysis because it causes necessary covariance matrices not to be inverted (Tabachnick & Fidell, 2007). In SEM analysis, extreme multi-collinearity decreases reliability of the results. The following three parts discuss some important issues regarding model testing procedures: model estimation, model evaluation, and model modification.

3.9.1.3.3. Model Estimation

In this study, the maximum likelihood estimation (MLE) was chosen to estimate free parameters in the measurement and structural models. It is default and the most widely used method in SEM analysis. MLE method focuses on "finding estimates for the model parameters that maximize the likelihood of observing the available data if one were to collect data from the same population again" (Raykov & Marcoulides, 2006, p. 27).

MLE technique assumes multivariate normality (Kline, 2011; Schumacker & Lomax, 2004). If the multivariate normality assumption is violated, MLE provides biased

Chi-square statistic and standard errors of parameter estimates, leading to rejecting correctly specified models (Finney & DiStefano, 2006). Although MLE is largely sensitive to the assumption of multivariate normality, the robustness of MLE has been proven in the absence of multivariate normality (Chou & Bentler, 1995; Hair et al., 2006; Hoyle & Panter, 1995; Schermelleh-Engel, Moosbrugger, & Müller, 2008; Stevens, 2009). In addition to multivariate normality, the MLE method requires continuous variable data (Kline, 2011; Schumacker & Lomax, 2004).

In the present study, when multivariate normality and measurement level of the observed variables are considered, it is tenable that MLE provided effective, unbiased, and consistent estimates in the study

3.9.1.3.4. Model Evaluation

There are many goodness-of-fit indices to determine how well the model fits the data. Each index has a relative superiority as compared to another index. Therefore, it is recommended that multiple indices of overall fit should be reported to evaluate the model fit (Dilalla, 2000; Hoyle & Panter, 1995; Schermelleh-Engel et al., 2008; Schumacker & Lomax, 2004). According to Hair et al. (2006), chi-square (χ2), degrees of freedom (d*f*), one incremental index, and one absolute index are adequate to provide unique information about the model fit.

Chi-square (χ^2) is a fundamental statistical measure of the difference between observed and estimated covariance matrices in SEM (Hair et al., 2006). In SEM analysis, only χ^2 test provides inferential statistical evaluation of the model fit (Schermelleh-Engel et al., 2008). It also is useful for comparisons of nested models (Hoyle & Panter, 1995).

The χ^2 test is based on the null hypothesis that the observed and estimated covariance matrices are equal. Therefore, the lesser the value of χ^2 test statistic is, the more similar the observed and estimated covariance matrices are. Moreover, a non-significant p-value (> .05) associated with χ^2 test statistic indicates that the model is not different form the observed covariance matrix. However, χ^2 statistics can be misleading in assessing a model fit because it is sensitive to sample size extensively (Dilalla, 2000; Hair et al., 2006; Kline, 2011; Schermelleh-Engel et al., 2008;

Schumacker & Lomax, 2004). For instance, if sample size is large, a small difference between the observed and estimated covariance matrices results in a significant probability level of χ^2 test, rejecting a plausible model. Thus, significance of χ^2 test statistic should be used with caution if the sample size is large. This measure is also sensitive to the assumption of multivariate normality.

In order to reduce sensitivity of χ^2 test statistics to sample size, normed χ^2 (i.e., the ratio χ^2 test statistic to the number of degrees of freedom) was used. If normed χ^2 is greater than 2 and less than 3, it indicates a good or acceptable model fit (Schermelleh-Engel et al., 2008). CMIN/DF in AMOS outputs represents this ratio.

Degrees of freedom (*df*) present an amount of mathematical information used to estimate model parameters (Hair et al., 2006). In SEM, *df* depends on the number of indicators in the model so it is free from an effect of sample size.

Incremental fit indices measure "the degree to which the model in question is superior to an alternative model, usually one that specifies no covariances among variables (i.e., "null" or independence model), in reproducing the observed covariances" (Hoyle & Panter, 1995, p. 165). As an incremental fit index, the comparative fit index (CFI) was used in this study. It focuses on "the relative improvement in the fit of the researcher's model over that of a baseline model, typically the independence model" (Kline, 2011, s. 208). It was preferred because CFI are less affected by sample size (Dilalla, 2000; Hu & Bentler, 1995). Moreover, it is relatively insensitive to model complexity (Hair et al., 2006). The CFI values range from 0 to 1; the values above .95 indicate that the model fits the data well.

Absolute fit indices measure "the degree to which the covariances implied by the fixed and free parameters specified in the model match the observed covariances from which free parameters in the model were estimated" (Hoyle & Panter, 1995, p. 165). As an absolute fit index, the root mean square error of approximation (RMSEA) was used in this study. It focuses on the fit of the model to the population covariance matrix and considers the error of approximation in the population (Byrne, 2010). It attempts to correct both sample size and model complexity; a low RMSEA value is indicative of a good model fit (Hair et al., 2006). In general, it is suggested that RMSEA values less than .05 are associated with a good model fit (Kline, 2011;

Schermelleh-Engel et al., 2008; Schumacker & Lomax, 2004). Hu and Bentler (1999) also suggest RMSEA value of less than .06 as a cutoff value for a good model fit. Moreover, as cited by MacCallum, Browne, and Sugawara (1996), Browne and Cudeck (1993) suggest that RMSEA values less than .05 indicate a close fit; RMSEA values in range of .05 and .08 indicate a fair fit; and RMSEA values greater than 1.0 indicate a poor fit. MacCallum et al. (1996) also suggested RMSEA values in the range of .08 to .10 indicate a mediocre fit.

As a conclusion, when evaluating the model fit in this study, χ^2 test, df, normed χ^2, CFI and RMSEA were used. Based on rules of thumb recommended by Schermelleh-Engel et al. (2008), the characteristics of the goodness-of-fit indices used in the study are summarized in Table 3.11.

3.9.1.3.5. Model Modification

If a model does not provide a satisfactory fit to data, a researcher can modify it to improve model fit. This process involves freeing or fixing parameters in a model. Although a researcher relies on many procedures to determine parameters which can be added or deleted from a model, an modification is only appropriate when a researcher justifies it conceptually and theoretically (Raykov & Marcoulides, 2006; Stevens , 2009).

In this study, modification indices (MI) were suggested to make any modification in the model if it is required. MI provide "approximately how much a proposed model's chi-square would decrease if a particular parameter were freely estimated or freed from a constraint it was involved in the immediately preceding modeling session"

Table 3.11

The Characteristics of the Goodness-of-fit Indices Used in the Study

Goodness-of-fit indices	Evidence of good fit	Evidence of acceptable fit
χ^2	$0 \leq \chi^2 \leq 2df$	$2df < \chi^2 \leq 3df$
p value	$.05 < p \leq 1.00$	$.01 \leq p \leq .05$
Normed χ^2	$0 \leq \chi^2 / df \leq 2$	$2 < \chi^2 / df \leq 3$
CFI	$.97 \leq CFI \leq 1.00$	$95 \leq CFI < .97$
RMSEA	$0 \leq RMSEA \leq .05$	$.05 < RMSEA \leq .08$

(Raykov & Marcoulides, 2006, p. 50). MI values are given for all non-free parameters. As noted by Schumacker and Lomax (2004), large modification indices indicate the parameters that can be allowed to become free to get a better model fit. When a parameter becomes free, χ^2 goodness of fit index is expected to decreases by least value of MI.

The results of SEM analysis cannot be considered as evidence for causality. When SEM analysis is based on non-experimental data, the verification of causality cannot be claimed (Blunch, 2008; Kline, 2011). In SEM analysis, causality can be disconfirmed but never be proved (Raykov & Marcoulides, 2006). Therefore, the results of SEM analysis may not corresponds to cause and effect relationships in real world.

3.9.2. The Analysis of the Qualitative Data

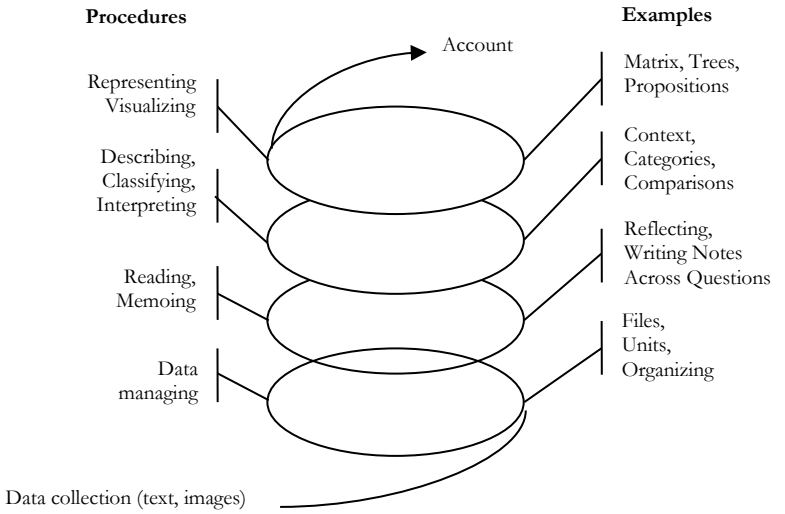
The qualitative data were analyzed using the qualitative content analysis. The researcher adapted the general analytical procedures outlined by Creswell (2007). Creswell uses a data analysis spiral to illustrate the qualitative data analysis process (Figure 3.11). It involved four main steps by which researchers move through from data collection to an account or narrative. The guidelines used in the qualitative data analysis entail judgment and creativity to some extent therefore each qualitative study is unique (Patton, 2002). The procedures adapted in this study are outlined as follow.

3.9.2.1. Data Management

The initial step of the data analysis involved transcribing the interview records and organizing the transcribed data. After all interviews had been completed, the researcher transcribed all records of the interviews, and converted the interview notes into a computer text file. Then, the transcribed data were organized into computer files. Moreover, the researcher prepared a list presenting when, where, and with whom the interviews were conducted.

3.9.2.2. Reading and Memoing

The second step of the qualitative data analysis consisted of rereading the transcribed data and writing memos when necessary. The researcher read through the transcripts



Note. Creswell (2007)

Figure 3.11 The data analysis spiral

and interview notes once more. This process allowed the researcher to get a sense of the data and become familiar with them. While reading the data, the researcher also wrote some memos including initial thoughts, interpretation, concepts, and possible categories, and highlighted important text segments.

3.9.2.3. Describing, Classifying, and Interpreting

This step of the data analysis included developing codes, uncovering themes, and providing interpretation. According to Creswell (2007), the process of developing codes is the foundation of the qualitative data analysis. In coding data, the researcher chose an interview, read and searched through the data for the patterns, identified the text segments (i.e., a word, a phrase, a sentence, or a paragraph) representing incidents, ideas, events, and acts related to purpose of the study, assigned a conceptual label into the text segments, and lastly, reduced overlapped and redundant codes. The conceptual codes consisted of both indigenous and sensitizing concepts. Whereas indigenous concepts are terms or phrases articulated by interviewees, sensitizing concepts are terms or phrases developed by researchers to best describe the data (Patton, 2002). During the coding process, the researcher also benefited from the literature related to TAM and adoption of EPSSs. He read the transcripts and interview notes over several times to ensure that the data were completely coded.

After developing the codes, the researcher engaged in aggregating similar codes into the themes that represent outstanding issues and matters regarding the purpose of the study. For example, "system complexity", "user interface", and "output quality" were aggregated together into the theme, "system characteristics". While developing themes, the researcher considered the convergence of the codes in each theme (internal homogeneity) and divergence among themes (external heterogeneity). Moreover, the researcher ensured that the themes sufficiently described the police officers' perceptions, thoughts, and experiences regarding the acceptance of the EPSS (external plausibility). The researcher also made sense of the data on the basis of his own understanding and prior studies on TAM and EPSS. Some implications of the findings were discussed.

3.9.2.4. Representing and Visualizing

After coding the data and uncovering themes, the researchers provided thick descriptions and some direct quotations to report the findings. The presentation of the findings was guided by the themes uncovered in the study.

Although an extended text is the most frequently used form to display findings in the qualitative research, it is possible to use better displays (e.g., matrices, graphs, charts, and networks) to augment understanding and conclusions (Miles & Huberman, 1994). In this study, the concept maps were used to present the results visually.

3.10. Assumptions

This study is guided by the following assumptions:

a. Two hour hands-on training programs were enough for the participants to form beliefs which explain the acceptance of the EPSS.

b. The participants understood the functions and functionalities of the EPSS adequately.

c. The participants gave careful attention to each item in the questionnaire and responded to them accurately.

d. When responding to the items or the interview questions, the participants considered the functions and functionalities of the EPSS rather than the software application system to which they were integrated.

e. The participants were honest when answering the questions in the interviews.

f. Reliability and validity of all measures in the study were accurate enough to permit accurate results.

3.11. Limitations

When interpreting or applying the findings of the study, some cautions are advised below.

a. The findings of the study were based on the police officers in the Crime Scene Investigation and Identification Units and the EPSS which were specially designed for job-related tasks in the Crime Scene Investigation and Identification Units.

b. This study focused on the police officers' behavioral intention to use the EPSS rather than its actual use.

c. The questionnaire was administered after the in-service training on how to use the EPSS, so it might influence the participants' thoughts and perceptions regarding the EPSS.

3.12. Validity and Reliability

The value of a study is based considerably on validity and reliability of findings. While validity refers to "the appropriateness, meaningfulness, correctness, and usefulness of the inferences a researcher makes", the reliability refers to "the consistency of scores or answers from one administration of an instrument to another, and from one set of items to another" (Fraenkel et al., 2012, p. 147). Due to the distinct nature of quantitative and qualitative research, there are different strategies to approach reliability and validity in each research design (LeCompte & Goetz, 1982). Therefore, in this mixed method research, a number of procedures were applied to ensure the validity and reliability of the findings.

3.12.1. Validity and Reliability in the Quantitative Phase of the Study

In order to ensure the validity of the quantitative findings, the researcher considered measurement validity, external validity, and internal validity. This study included three evidences for the measurement validity. First, the items were adapted from the valid measurement scales in the previous studies and translated using the back translation method. Second, several experts and police officers independently reviewed the content and format of the questionnaire. Lastly, the factor analysis was conducted to examine construct validity of the questionnaire.

The external validity of the quantitative phase of the study was improved by providing demographics of the sample (i.e., gender, age, education level, experience in the Crime Scene Investigation and Identification Units, and expected intensity of job-related use of the EPSS) in a detailed manner. Thus, practitioners can judge the degree of the generalizability of the findings for their own context.

The internal validity of the quantitative phase of the study was enhanced through two strategies. First, different trainers administered the questionnaire so they took the instruction to follow similar procedures during the data collection. In this way, possible threats associated with data collector were controlled. Second, the pilot study was conducted to ensure accuracy of the followed procedures in the study.

In order to address the reliability of the quantitative findings, the internal consistency of the questionnaire was assessed by calculating Cronbach's alpha coefficients in the pilot study and actual study. An acceptable value for Cronbach's Coefficient alpha is .70 to .80 (Field, 2009; Hair et al., 2006).

3.12.2. Validity and Reliability in the Qualitative Phase of the Study

In the qualitative research, the concepts of validity and reliability are handled differently from the quantitative research. The main question in a qualitative research is "How can an inquirer persuade his or her audiences that the research findings of an inquiry are worth paying attention to?" (Lincoln & Guba, 1985, p. 290). The terms of credibility, transferability, dependability, and confirmability were offered as qualitative counterparts of internal validity, external validity, reliability, and objectivity

of quantitative research for the quality of the study (Guba & Lincoln, 1989; Lincoln & Guba, 1985). These four criteria collectively determine the trustworthiness of the study.

Credibility refers to a correspondence between the realities constructed by the respondents and those embodied by the researcher (Guba & Lincoln, 1989). In this study, three strategies were employed to increase the credibility of the qualitative findings. First, before the interviews took place, the researcher tried to spend a considerable time with the participants to establish a rapport and build trust in the setting. The prolonged engagement enabled the researcher to acquire the high quality of information about the acceptance of the EPSS. Second, the researcher engaged in a discussion on his analysis, findings, and conclusions with his colleague who had information about the general framework of the study. The peer debriefing enabled the researcher to understand his own bias, clarify his experiences, perceptions, and interpretations related to acceptance of the EPSS. Lastly, the interviews involved the police officers that were genuinely willing to share their ideas freely. They were also encouraged by stressing confidentiality of the data, the right to withdraw from the interview at any time, and the autonomy of the researcher. The honesty of the respondents enabled the researcher to gain the participants' experiences and perceptions thoroughly.

Transferability focuses on the degree of the applicability of the qualitative findings into the other similar context (Guba & Lincoln, 1989). In the qualitative phase of the study, two strategies were used to address the transferability of the findings. First, the researcher described the research context, the methods, and findings in sufficient detail and precision so that the practitioners can judge their applicability for their own context (the thick description). Second, purposeful sampling with an intensity sampling strategy was utilized to obtain rich and detailed information about the issues of the usefulness and ease of use of the EPSS.

While dependability refers to consistency of data across time, researchers, and analysis techniques, confirmability refers to dependence of data, interpretations, and conclusions on the context and respondents rather than researcher (Gasson, 2004; Guba & Lincoln, 1989). In the qualitative phase of this study, the use of an audit trail

Table 3.12

The Evidences of the Validity and Reliability Issues in the Study

The Quantitative Phase of the Study	
Measurement Validity	• Items adapted from valid measurement scales • Revision of the questionnaire reviewed by experts and police officers • Factor analysis
External Validity	• The demographics of the sample in enough detail
Internal Validity	• Instruction on how to administer the questionnaire to address the threat of data collector characteristics and bias • Pilot study
Reliability	• Cronbach's alpha coefficients
The Qualitative Phase of the Study	
Credibility	• Prolonged engagement • Peer debriefing • Honesty of the respondents
Transferability	• Thick description • Purposeful sampling
Dependability	• Audit trail
Confirmability	• Audit trail

contributed to both dependability and conformability of the findings. The audit trail consisted of the interview records, the interview notes, the original interview transcripts, the data analysis documents, and the dissertation. Table 3.12 summarizes the validity and reliability issues addressed in the quantitative and qualitative phases of the study.

3.13. Summary

Figure 3.12 summarizes the research methodology used in the study.

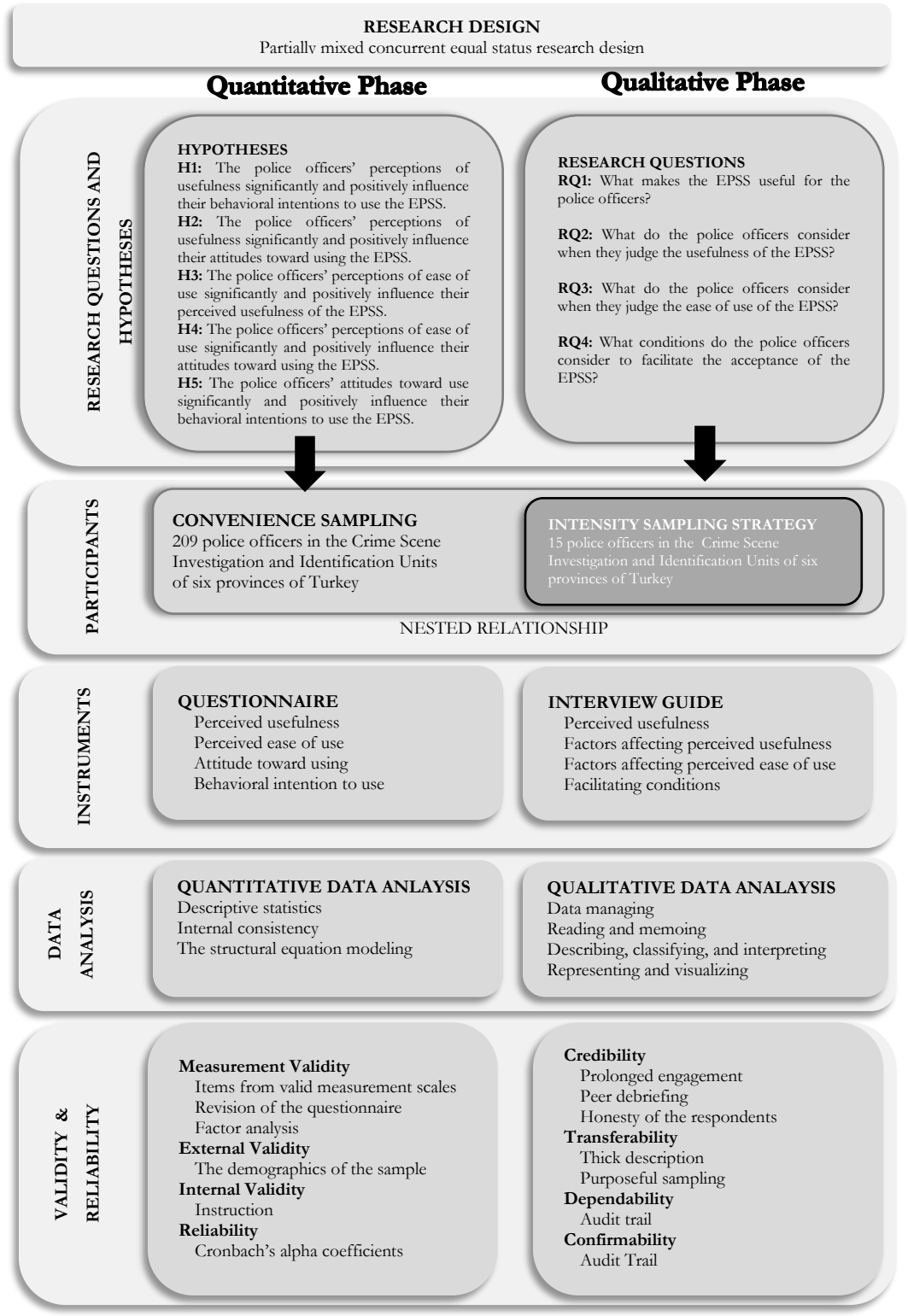


Figure 3.12 Summary of the methodology

CHAPTER IV

FINDINGS

This chapter consists of the findings of the study. Firstly, the findings of the quantitative phase of the study are presented, including demographics of the participants, descriptive statistics, and the assessment of the measurement and structural models. Also, the reliability analyses of the scales are provided. Secondly, the results of the content analysis of the interviews are presented.

4.1. The Findings of the Quantitative Phase of the Study

This part of the chapter presents the findings regarding the demographics of the participants, the descriptive statistics, and the assessment of the measurement and the structural models. In addition, it includes the reliability analyses of the scales.

4.1.1. Demographics of the Participants

The participants of the quantitative phase of the study consisted of 209 police officers in the Crime Scene Investigation and Identification Units in six provinces of Turkey. The participants included 190 (90.9%) males and only 6 (2.9%) females.Of the participants, 13 (6.2%) did not state their genders. The age of the participants ranged from 23 to 52, with a mean of 39.07 and a standard deviation of 4.81 (Table 4.1).

The researcher also grouped the participants according to their ages. Of the participants, 12.4% were between the ages of 23 and 35, 45.9% were aged between 36 and 40, 16.3% were between 41 and 45, and 8.6% were 46 or older. However, 16.7% of the participants did not state their ages. Table 4.2 illustrates the distribution

Table 4.1

The Age of the Participants

	n	M	SD	Minimum	Maximum
Age (years)	174	39.07	4.81	23	52

Table 4.2

The Distribution of the Participants by Age

	n	%
Age (years)		
23-35	26	12.4
35-40	96	45.9
41-45	34	16.3
46 or older	18	8.6
No Response	35	16.7

Note. $n = 209$

of the participants by age.

In terms of educational background, more than half (53.6%) of the participants held an associate degree, 30.1% had a master's degree, 4.3% held a doctoral degree, and 2.9% obtained high school degrees. Of the participants, 9.1% did not state their educational levels. Table 4.3 shows the distribution of the participants by level of education.

Table 4.3

Educational Background of the Participants

	n	%
Highest education level completed		
High School	6	2.9
Associate Degree	112	53.6
Master's Degree	63	30.1
Doctoral Degree	9	4.3
No Response	19	9.1

Note. $n = 209$

The participants' experience in the Crime Scene Investigation and Identification Units ranged from 1 to 20 years, with a mean of 10.43 and a standard deviation of 4.50 (Table 4.4).

Table 4.4

The Participants' Experience in the Crime Scene Investigation and Identification Units

	n	M	SD	Minimum	Maximum
Experience (years)	182	10.43	4.50	1	20

Table 4.5

The Distribution of the Participants by Years of Experience in the Crime Scene Investigation and Identification Units

	n	%
Experience (years)		
1 – 5	25	12.0
6 – 10	72	34.4
11 – 15	63	30.1
16 – 20	22	10.5
No Response	27	12.9

Note. n= 209

The researcher also grouped the participants according to their years of experience in the Crime Scene Investigation and Identification Units. Of the participants, 12.0 % had experience between 1-5 years, 34.4 % between 6-10 years, 30.1 % between 11-15 years, and 10.5% between 16-20 years. 12.9% of the participants did not respond to this question. The distribution of the participants by years of experience in the Crime Scene Investigation and Identification Units is given in Table 4.5.

Lastly, the participants were asked to estimate the intensity of their job-related use of the EPSS. While the majority of the participants (65%) estimated the heavy use of the EPSS on the job, the minority of them (5.7%) estimated the light use of the EPSS on the job. On the other hand, 19.6 of participants estimated neither the light nor the heavy use of the EPSS on the job. Of the participants, 9.6% did not make any estimation. Table 4.6 shows the estimations of the participants related to the

Table 4.6

Estimation of the Participants Related to the Intensity of Their Job-Related Use of the EPSS

	n	%
The Intensity of the job related system use		
Extremely light	5	2.4
Moderately light	3	1.4
Somewhat light	4	1.9
Neither light or heavy	41	19.6
Somewhat heavy	42	20.1
Moderately heavy	63	30.1
Extremely heavy	31	14.6
No response	20	9.6

Note. n = 209

intensity of their job-related use of the EPSS.

4.1.2. Descriptive Statistics

Table 4.7 reports mean and standard deviation values of the participants' responses to the individual items related to perceived usefulness, perceived ease of use, attitude toward using, and behavioral intention to use. All means are greater than 5.0, ranging from 5.66 to 6.29. All standard deviations are below 2.0, ranging from 1.20 to 1.57.

Table 4.7

Descriptive Statistics of the Items Measuring the Constructs

Construct	Items	n	Mean	SD
Perceived Usefulness (PU)	PU1. Using the system in my job would enable me to accomplish tasks more quickly.	208	5.76	1.57
	PU2. Using the system would improve my job performance.	209	5.73	1.49
	PU3. Using the system in my job would increase my productivity.	206	5.74	1.49
	PU4. Using the system would make it easier to do my job.	208	5.66	1.55
	PU5. I would find the system useful in my job.	208	5.84	1.39
Perceived Ease of Use (PEU)	PEU1. Learning to operate the system would be easy for me.	209	5.88	1.26
	PEU2. I would find it easy to get the system to do what I want it to do.	209	5.73	1.33
	PEU3. I would find easy for me to become skillful at using the system.	209	6.07	1.26
	PEU4. I would find the system easy to use.	205	5.87	1.28
Attitude toward Using (A)	A1. Using the system is a … idea. [bad – good]	203	5.84	1.36
	A2. Using the system is a … idea. [foolish – wise]	203	5.96	1.32
	A3. I … the ideas of using the system. [dislike – like]	203	5.93	1.30
	A4. Using the system is … . [unpleasant – pleasant]	203	5.75	1.35
Behavioral Intention to Use (IU)	IU1. Assuming I have access the .system, I intend to use it.	209	6.29	1.23
	IU2. Given that I have access the system, I predict that I would use it.	209	5.97	1.37
	IU3. Given that I have access the system, I plan to use it.	208	6.14	1.20

4.1.3. The Internal Consistencies of the Scales

The internal consistency of the four scales was tested using Cronbach's alpha coefficient. The values of the Cronbach's alpha ranged from .91 to .95, indicating high reliability. Cronbach's alpha coefficients of the scales are presented in Table 4.8. The reliability of total scale items is also high, Cronbach's alpha = .95.

4.1.4. The Structural Equation Modeling

The following part of the chapter presents the results related to the preliminary analyses, test of the measurement model, and test of the structural model.

4.1.4.1. Preliminary Analyses

Before SEM analysis, the assumptions were tested. As indicated in previous chapter, they include sample size, missing data, multivariate outliers, multivariate normality, and multicollinearity.

a. Sample Size

The model in this study involved four constructs each with at least three items, and with high item communality (.6 or higher). Therefore, the sample size (N=209) in this study was regarded as sufficient.

b. Missing Data

In this study, a preliminary missing value analysis indicated that 14 (6.70%) cases had at least one missing value while 195 (93.30%) cases had no missing data. Table 4.9 shows the number and percentage of cases with missing value for each variable.

Table 4.8

Cronbach's Alpha Coefficients of the Scales

	Number of Items	Cronbach's Alpha
Perceived Usefulness	5	.91
Perceived Ease of Use	4	.95
Attitude toward Using	4	.93
Behavioral Intention to Use	3	.91
TOTAL	16	.95

The percentage of cases with missing value in the variables did not exceed 3%. Schumacker and Lomax (2004) assert that mean substitution is the best option for the data with small number of missing values. Therefore, in this study, the researcher decided to use an imputation technique by substituting missing values in each variable with the mean of all valid values of that variable.

c. Multivariate outliers

Based on inspection of D^2 values (Table 4.10), the researcher judged five cases as distinctly different from all others and deleted them from the further analysis. Finally, 204 cases were used in SEM analysis.

d. Multivariate Normality

As shown in Table 4.11, in the present study, absolute values of kurtosis index of the observed variables ranged from 1.29 to 7.70; and absolute values of skew index of the observed variables ranged from 1.13 to 2.58. Based on the rule of thumb offered by Kline (2011), the data are not severely univariate non-normal. In addition,

Table 4.9

The Number and Percentage of Missing Values

	Missing Data	
Variable	Number	Percent
PU1	1	.5
PU2	-	-
PU3	3	1.4
PU5	1	.5
PU6	1	.5
PEU1	-	-
PEU2	-	-
PEU5	-	-
PEU6	4	1.9
A1	6	2.9
A2	6	2.9
A3	6	2.9
A4	6	2.9
IU1	-	-
IU2	-	-
IU3	1	.5

Note. PU: Perceived Usefulness; PEU: Perceived Ease of Use; A: Attitude toward Using; IU: Behavioral Intention to Use

Table 4.10

Mahalanobis Distances

Cases	D^2
66*	85.50
35*	82.83
19*	76.22
174*	72.99
21*	66.78
97	59.45
203	58.33
197	54.03
121	52.59
90	51.30
29	49.07
.	.
.	.
.	.

Note. * cases with D^2 values distinctively different form others

Mardia's normalized estimate of multivariate kurtosis, 51.53, is less than the computed value of 288 based on the formula p * (p + 2) where p is equal to the number of observed variables in the model, which is indicative of multivariate normality. Moreover, it is tenable that non-normality does not make a substantive difference in the analysis because the sample size is sufficient enough to minimize the impact of the non-normality of the data on the findings. As a conclusion, the multivariate normality of the data was assumed in the study.

e. Multi-collinearity

The correlation matrix was examined for bivariate collinearity among the observed variables in the model (Table 4.12). None of the observed variables highly correlated (above .90) with each other. Only two pairs of the observable variables indicated relatively high correlations: PU2 and PU3 (.88) and A1 and A2 (.86). In addition to the relationships among the observed variables, the correlations among the latent constructs were inspected. The correlation among the latent constructs ranged from .57 to .73 and therefore there were not high correlations between them, causing multi-collinearity.

Table 4.11

The Distribution of the Observed Variables in the Model

Latent variable	Observed variables	Skew	Kurtosis
Perceived Usefulness	PU1	-1.52	1.82
	PU2	-1.39	1.48
	PU3	-1.51	2.11
	PU4	-1.30	1.29
	PU5	-1.47	2.06
Perceived Ease of Use	PEU1	-1.52	2.89
	PEU2	-1.32	1.96
	PEU3	-1.80	3.82
	PEU4	-1.42	2.59
Attitude toward Using	A1	-1.36	2.52
	A2	-1.55	3.22
	A3	-1.44	2.72
	A4	-1.13	1.50
Behavioral Intention to Use	IU1	-2.58	7.70
	IU2	-1.90	3.60
	IU3	-2.01	4.94

As a result, before the SEM analysis, the preliminary analyses were conducted to address the issues related to sample size, missing data, multivariate outliers, multivariate normality, and multicollinearity. The results of the analyses indicated that the sample size was sufficient for the SEM analysis. The mean substitution was used to handle missing data. The five cases detected as outliers were removed for the further analyses. The multivariate normality of the data was assumed. There were not any high correlations between the variables, indicating no muticollinearity.

4.1.4.2. Test of the Measurement Model

The measurement model deals with the relationship between observed variables and the latent variables. It was tested by Confirmatory Factor Analysis (CFA). The assessment of the measurement model included assessing goodness-of-fit indices for the model

Table 4.12

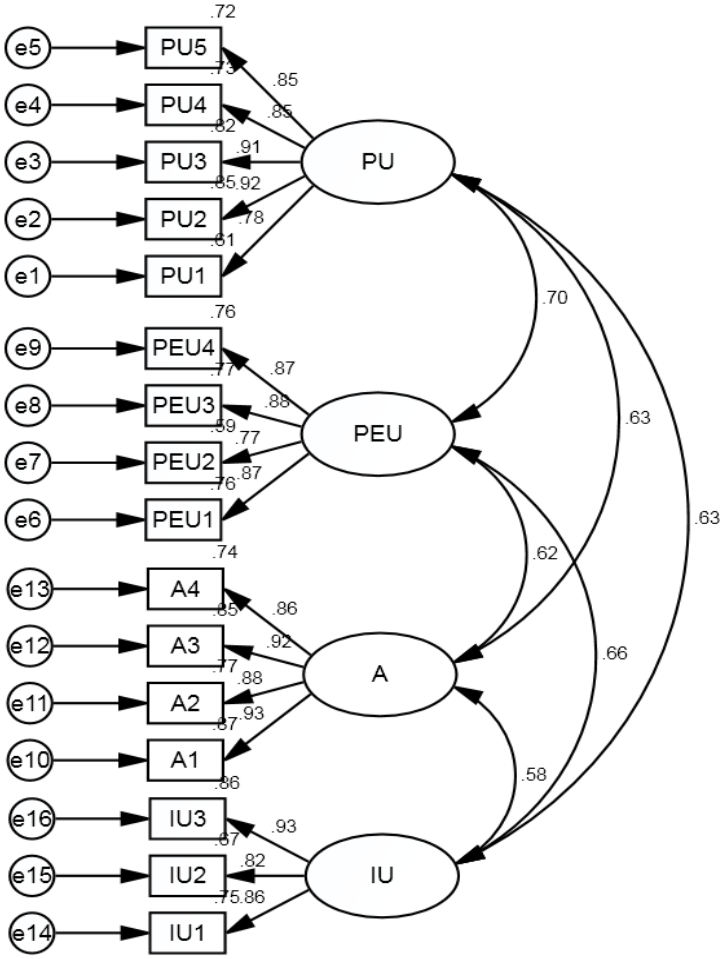
Intercorrelations of the Observed Variables

	Observed Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.	PU1	—															
2.	PU2	.71	—														
3.	PU3	.67	.88	—													
4.	PU4	.70	.76	.76	—												
5.	PU5	.68	.76	.74	.77	—											
6.	PEU1	.46	.53	.52	.55	.57	—										
7.	PEU2	.57	.68	.64	.67	.63	.72	—									
8.	PEU3	.49	.48	.46	.51	.55	.76	.61	—								
9.	PEU4	.46	.49	.47	.55	.56	.75	.63	.81	—							
10.	A1	.47	.52	.49	.48	.55	.48	.55	.52	.51	—						
11.	A2	.40	.48	.47	.44	.52	.43	.45	.41	.42	.86	—					
12.	A3	.53	.54	.52	.55	.60	.48	.57	.48	.50	.84	.79	—				
13.	A4	.51	.48	.46	.48	.51	.41	.53	.43	.44	.78	.72	.84	—			
14.	IU1	.51	.47	.46	.50	.53	.49	.43	.58	.48	.46	.49	.47	.39	—		
15.	IU2	.48	.47	.46	.45	.43	.48	.46	.56	.49	.41	.38	.45	.41	.69	—	
16.	IU3	.52	.51	.52	.47	.51	.49	.45	.57	.47	.51	.49	.49	.46	.80	.76	—

Note. All coefficients are significant at $p < .01$.
PU: Perceived Usefulness; PEU: Perceived Ease of Use; A: Attitude toward Using; IU: Behavioral Intention to Use.

First of all, the overall fit of the measurement model was assessed by using chi-square (χ^2) statistics, degrees of freedom (df), normed χ^2, Comparative Fit Index (CFI), and Root Mean Square Error Approximation (RMSEA). The initial estimation and examination of the measurement model revealed a χ^2 value of 270.58, with 98 degrees of freedom and a probability value less than .001. The value of normed χ^2 was 2.75. The value for CFI was .94. RMSEA had a value of .093. Figure 4.1 illustrates the path diagram and the standardized coefficients of the measurement model.

The significant p-value associated with χ^2 indicated a problem with the model fit. As indicated in the previous chapter, however, the sensitivity of the χ^2 test to sample size makes the resulting p-value less meaningful and practical. As a fit index less sensitive to sample size, the normed χ^2 value, 2.75, indicated an acceptable model fit. On the other hand, the value of CFI was less than .95, indicating a lack of acceptable model fit. Moreover, the value of RMSEA was between .08 and 1.00, representing a mediocre model fit (MacCallum et al., 1996).



Note. PU: Perceived Usefulness; PEU: Perceived Ease of Use; A: Attitude toward Using; IU: Behavioral Intention to Use

Figure 4.1 Standardized coefficients for the measurement model

The results of the initial assessment of the measurement model showed that the model provided a mediocre fit, and thus it was reasonable to proceed to inspect the modification indices (MIs) to improve the overall model fit. A review of the MIs revealed that two covariance between error terms deserved attention in improving the model fit.

The clearest evidence of misspecification was associated with the covariance of the error terms of PU2 and PU3 (MI = 26.16). PU2 asks whether the performance of the respondents is improved through the EPSS whereas PU3 asks whether the productivity of the respondents is increased through the EPSS. The content overlap between items justified the error covariance between PU2 and PU3.

Table 4.13

The Summary of the Post Hoc Model Modifications

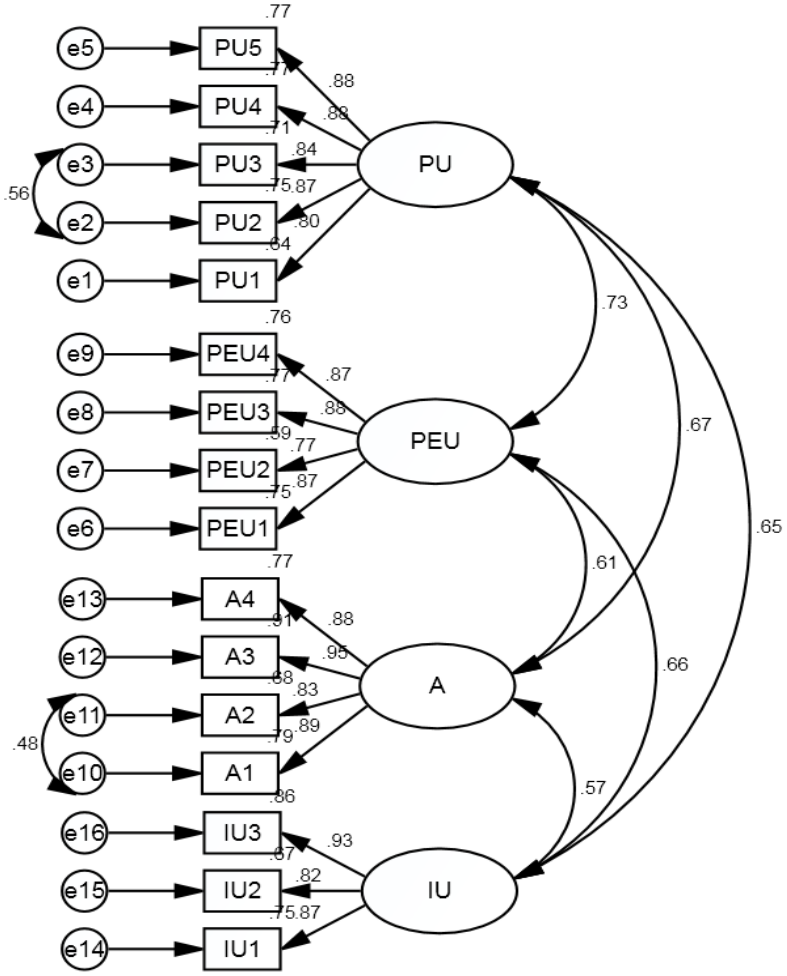
Model	χ^2	*df*	CFI	RMSEA	Model Comparison	$\Delta\chi^2$	Δdf
0 Hypothesized	270.58	98	.94	.093	---	---	---
1 e3 <--> e2 [a]	225.97	97	.96	.081	0 vs. 1	44.61**	1
2 e10 <--> e11 [b]	194.58	96	.97	.071	1 vs. 2	31.39**	1

Note. a. The error covariance between PU2 and PU3
b. The error covariance between A1 and A2
CFI = comparative fit index; RMSEA = root mean square error of approximation
* $p < .05$, ** $p < .01$

The other evidence of misspecification was associated with the covariance of the error terms of A1 and A2 (MI = 18.05). A1 asks whether the idea of using the EPSS is bad or good, whereas A2 asks whether the idea of using the EPSS is foolish or wise. Clearly, the content overlap between items again justified the error covariance between A1 and A2. Table 4.13 summarizes the process of modifying the measurement model. Figure 4.2 illustrates the path diagram and the standardized coefficients of the final measurement model.

In the final measurement model, the overall model χ^2 was 194.58, with 96 degrees of freedom and a probability of .00. The ratio χ^2 / df of 2.03 represented an acceptable fit of the model. The CFI had a value of .97, suggesting a good model fit. The value of RMSEA was .071, reflecting an additional evidence for an acceptable fit of the model. As a result, the results of CFA suggested that the measurement model had an acceptable model fit. Table 4.14 shows the model fit indices for the measurement model.

As a conclusion, the CFA was conducted to test the measurement model. The initial assessment of the measurement model produced a mediocre model fit, χ^2 (98) = 270.58, p = .00; CFI = .94; RMSEA = .093. After the modifications in the model, the goodness-of-fit indices indicated an acceptable level of convergence between the observed and estimated covariance matrices, χ^2 (96) = 194.58, p = .00; CFI = .97; RMSEA = .071.



Note. PU: Perceived Usefulness; PEU: Perceived Ease of Use; A: Attitude toward Using; IU: Behavioral Intention to Use

Figure 4.2 Standardized coefficients for the final measurement model

4.1.4.3. Test of the Structural Model

The structural model emphasized nature and magnitude of the relationships between the constructs: perceived usefulness, perceived ease of use, attitude toward usage,

Table 4.14

Fit Indices for the Measurement Model

Model	χ^2	*df*	Normed χ^2	CFI	RMSEA
Measurement Model	194.58**	96	2.03	.97	.071

Note. CFI = comparative fit index; RMSEA = root mean square error of approximation
* $p < .05$; ** $p < .01$; *** $p < .001$

and behavioral intention to use. The assessment of the structural model validity involved two basic steps: (a) assessing overall structural model fit and (b) examining the dependence relationships.

In the assessment of the structural model, firstly, the overall model fit was assessed by using chi-square (χ^2) statistics, degrees of freedom (df), normed χ^2, Comparative Fit Index (CFI), and Root Mean Square Error Approximation (RMSEA). χ^2 was equal to 208.76, with 97 degrees of freedom and a probability value less than .001. Although the χ^2 test is statistically significant ($p < .001$), it is a less useful and practical fit index to make a decision about the model fit because of the sensitivity of the χ^2 test to sample size. The normed χ^2 was 2.14, within the range associated with an acceptable model fit. CFI was equal to .96, indicating an acceptable level of model fit. RMSEA had a value of .075, representing an additional evidence for an acceptable model fit. As a result, all of the selected model fits suggested an acceptable level of model fit. Table 4.15 presents the model fit indices of the structural model.

In the assessment of the structural model, secondly, it is necessary to examine the structural parameter estimates for the hypothesized relationships. Table 4.16 shows estimated unstandardized and standardized structural parameters. The results show that the perceived usefulness of the EPSS influences intention to use ($\beta = .50$; $p < .001$) and attitude toward usage ($\beta = .47$; $p < .001$), supporting hypotheses H1 and H2 respectively. Perceived ease of use influences perceived usefulness ($\beta = .74$; $p < .001$) and attitude toward usage ($\beta = .27$; $p < .01$), supporting hypotheses H3 and H4 respectively. Attitude toward using the EPSS was found to influence intention to use ($\beta = .24$; $p < .01$), supporting hypotheses H5. As a conclusion, the results indicated that all hypothesized structural relationships were supported by the data. All hypothesized structural relationships were statistically significant and in the predicted directions. The structural model with standardized parameter estimates is also

Table 4.15

Fit Indices for the Structural Model

Model	χ^2	Df	Normed χ^2	CFI	RMSEA
Structural Model	208.76**	97	2.14	.96	.075

Note. CFI = comparative fit index; RMSEA = root mean square error of approximation
* $p < .05$; ** $p < .01$; *** $p < .001$

Table 4.16

Structural Parameter Estimates in the Structural Model

Structural Relationship	Unstandardized Parameter Estimate	Standard Error	t-value	Standardized Parameter Estimate
H1: PU → IU	.40	.07	5.57***	.50
H2: PU → A	.41	.09	4.79***	.47
H3: PEU → PU	.89	.09	10.17***	.74
H4: PEU → A	.29	.10	2.89**	.27
H5: A → IU	.22	.08	2.90**	.24

Note. PU: Perceived Usefulness; PEU: Perceived Ease of Use; A: Attitude toward Using; IU: Behavioral Intention to Use

* $p < .05$; ** $p < .01$; *** $p < .001$

depicted in Figure 4.3.

In addition, the direct and indirect effects of the latent variables are presented in Table 4.17. In addition to the aforementioned direct influence, perceived ease of use had higher indirect influence on attitude toward EPSS use (β = .35). Moreover, its indirect influence on intention to use was found to be relatively high (β = .52). Also, perceived usefulness had an indirect influence on intention to use; however, this

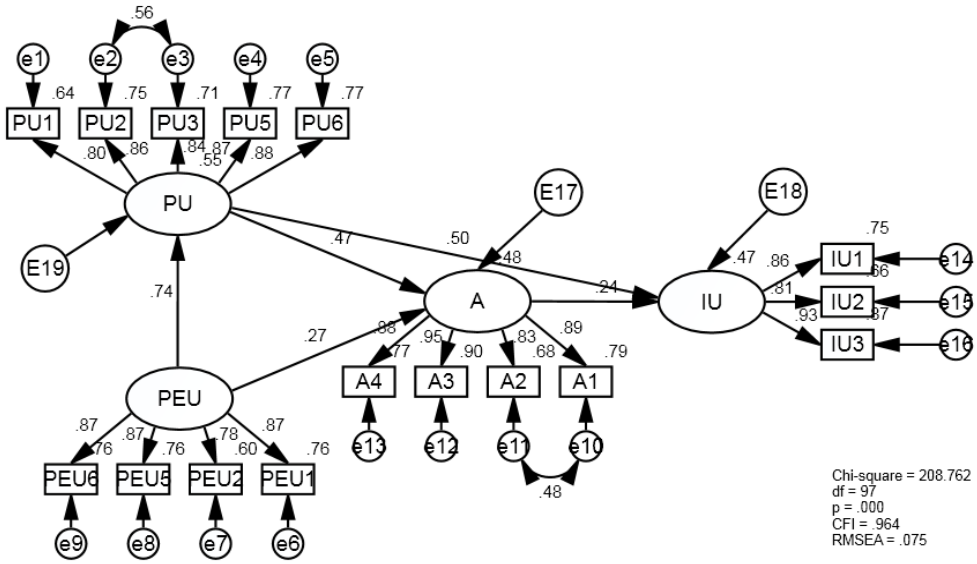


Figure 4.3 Standardized structural parameter estimates for the structural model

Table 4.17

Standardized Direct and Indirect Effects in the Model

Predictor	Criterion	*Direct Effect*	*Indirect Effect*
PEU	PU	.74	—
	A	.27	.35
	IU	—	.52
PU	A	.47	—
	IU	.50	.11
A	IU	.24	—

Note. PU: Perceived Usefulness; PEU: Perceived Ease of Use; A: Attitude toward Using; IU: Behavioral Intention to Use

influence was lower than its direct influence (β = .11). Overall, the model explained 47% of variance in intention to use EPSS, 48% of variance in the attitude toward usage, and 55% of perceived usefulness.

As a conclusion, after the assessment of measurement model, the structural model was tested using maximum likelihood estimation. The findings showed that the overall fit of the structural model was acceptable, χ^2 (97) = 208.76, p = .00; CFI = .96; RMSEA = .075. Moreover, the parameter estimates supported all hypothesized relationships among the constructs involved in TAM. Therefore, the structural model was validated. The findings support the following hypotheses.

- The police officers' perceptions of usefulness significantly and positively influence their behavioral intentions to use the EPSS. (Hypothesis H1)
- The police officers' perceptions of usefulness significantly and positively influence their attitudes toward using the EPSS. (Hypothesis H2)
- The police officers' perceptions of ease of use significantly and positively influence their perceived usefulness of the EPSS. (Hypothesis H3)
- The police officers' perceptions of ease of use significantly and positively influence their attitudes toward using the EPSS. (Hypothesis H4)
- The police officers' attitudes toward use significantly and positively influence their behavioral intentions to use the EPSS. (Hypothesis H5)

4.2. The Findings of the Qualitative Phase of the Study

The findings of the qualitative phase of the study are presented in four parts. The first part addresses the police officers' perceptions and thoughts regarding the usefulness of the EPSS in the job. The second part focuses on factors that the police officers considered as evaluating the usefulness of the EPSS on the job. The third part emphasizes factors that the police officers took into consideration when judging the ease of use of the EPSS on the job. The last part includes the police officers' thoughts about facilitating conditions for the acceptance of the EPSS. The codes under the themes were underlined. The direct quotations were given in both English and Turkish.

4.2.1. What Makes the EPSS Useful for the Police Officers? (Research Question 1)

The analysis of the interviews revealed that the EPSS would be useful for the police officers in many ways. Five overarching themes were found: (a) access to information; (b) time saving, (c) performing tasks more accurately; (d) reduction of variability in work; and (e) making work easier.

Access to information

The participants' responses clearly indicated that the EPSS would enable them to acquire and remember information required to perform their tasks successfully. Most of the interviewed police officers (n = 10) emphasized the benefits of <u>on-demand access to information</u>. Especially, the police officers thought that they would access information through the context-sensitive support system whenever it eluded them. One of the police officers in the Crime Scene Investigation Bureau said:

> … in the crime scene you would have a question on your mind. You may know or be sure [of the answer], but when a question would come to your mind, [the system] could be a resource that you may need if you would have [the mobile personal computer] in the crime scene. … That resource should not be a superficial or shallow, but comprehensible. Without using academic terms, it should [explain] the basics of our work such as wrapping and so on. It is a sort of reminder."
>
> … olay yerinde kafana bir şey takıldı. Eğer onu olay yerine … [taşınabilir kişisel bilgisayarı] götürdüysen teknik desteğe, [cevabını] sen bilebilirsin emin

> de olabilirsin, ama kafanda bir soru işareti düştüğünde [sistem] ihtiyaç duyabileceğin bir kaynak olur. … O kaynağında yüzeysel değil, anlaşılır olmalı. Kitabi terimlere girmeden, bizim işimizin özünü işte paketlemesi falan filan [anlatmalı]. Hatırlatıcı anlamda.

In addition, some of the interviewed police officers (n = 5) stressed the benefits of access to support resources in the EPSS. They agreed that the resources in the content management system would accommodate their different knowledge or skill needs. One of the police officers in the Latent Print Development bureau stated:

> In our spare time, I would review the formulas [on the system]. [The system] is good but not only in terms of the formulas. For instance, it explains how to apply them. … Supposing that I have a spare time or I am bored, I would review and look at [the formula].
>
> Boş zamanlarımızda formüllere ben [sistemden] açıp bakayım yine derim. [Sistem] güzel ama sadece formül açısından değil. Mesela uygulanışı filan anlatılıyor. …. Ben diyelim ki bir boşluk oldu, canım sıkıldı, açıp orada [formulü] bir gözden geçireyim deyip bakarım.

Some of the interviewed police officers (n = 3) clearly noted that the EPSS would reduce the need for consulting to complete their tasks on the job. They pointed that rather than asking the coworkers, they could easily access whatever is needed to perform the tasks through the EPSS. Also, one of the interviewed police officers suggested that EPSS would reduce the need for training when it delivers new procedures related to an crime scene investigation.

Time saving

The interviews revealed that using the EPSS would result in time saving on the job in many ways. Five of the interviewees emphasized that the EPSS would allow completion of the tasks promptly. In particular, the interviewed police officers of the Crime Scene Investigation Bureau stated that they would complete all tasks during an crime scene investigation. They would not leave any task that requires completion in the office. For instance, the EPSS enabled them to generate all reports related to the crime scene investigation just after completing the investigation. Although this issue appears to be related to the mobility of personal computers, the police officers associated it with the system. One of the police officers in the Crime Scene Investigation Bureau said:

> … [Through the system,] generating reports in crime scenes will result in an important time saving. In this regard, one of the most important contributions of [the system] to us is time saving because one of the most important issues for our job is time. The better we use time, the more useful [the system] is.
>
> … [Sistem sayesinde,] raporların olay yerinde yazılması zaman bakımından önemli tasarrufa yol açacaktır. Bu bakımdan [sistemin] bize getireceği en önemli katkılardan birisi zaman tasarrufu olacaktır, çünkü bizim için yarıştığımız en önemli unsurlardan birisi zamandır. Ne kadar çok zamanı iyi bir şekilde kullanırsak [sistem] bizim için o kadar yararlı olur.

Moreover, two of the interviewees indicated that the EPSS would enable them to complete the tasks quickly. One of them emphasized the technical specifications of the mobile personal computers whereas the other focused on the process of generating the reports. Lastly, one of the police officers underlined that access to the support resources would reduce the amount of time they need to find any help to achieve the tasks.

Performing tasks more accurately

The analysis of the interviews showed that the EPSS would enable the police officers to perform the tasks in a more accurate way. Some of the interviewed police officers (n=5) indicated that the wizard would structure their tasks and guide them through the tasks. Moreover, two of the interviewees emphasized that the system would inform them about the errors which they might make on the job, and therefore it would help them to avoid the errors. By covering these two issues, one of the police officers stated:

> [Through the system,] we can see all kinds of mistakes we made. The system gives us a notice before making any mistakes. This means when we do an operation, it firstly shows us whether we do it in the right way or not. The step by step directions of the system [guide] anyone who knows just how to open and shut down the computer. It says 'Save it. You cannot go further without saving'. As a result, it teaches about how to perform the tasks step by step.
>
> [Sistem sayesinde,] yaptığımız her türlü yanlışı görebiliyoruz. Görmeden önce zaten bize uyarı veriyor program. Yani bir işlem yapacak isek o işlem doğru yolda mı değil mi bize ilk önce onu gösteriyor bize zaten kendisi. Bilgisayarı çok fazla değil az bir şeyde bilgisayarı açıp kapatmayı bilen bir insanı zaten ne

> yapıyor yönergesi ile adım adım [yönlendiriyor]. Bize diyor ki kaydet, kaydetmeden ileri geçemezsin. Sonuçta adım adım bize işi öğretiyor zaten.

Reducing variability in work

The analysis results indicated that the EPSS would decrease variability in the with regard to tasks and workflow. Six of the interviewed police officers expressed that EPSS would facilitate standardizing the tasks, especially related to the process of reporting. One of them said:

> You know, the coworkers come from Crime Scene Investigation and Identification Unit in different provinces where the practices are different. They write the report like an essay. The reports are different. There are some differences in process of delivering and receiving the evidences. However, if the practices are set in the same standard for each unit, it would be more useful.
>
> Yani şimdi arkadaşlar başka bir ilden geliyorlar, uygulama farklı. Düz rapor yazıyorlar. İşte ne bileyim raporda daha değişik. Teslim tesellümde farklılıklar var. Ama bu her ilde aynı şekilde tek bir standarda oturtturulması çok faydalı olacak.

Moreover, four of the interviewees emphasized the EPSS would enable them to follow a uniform workflow on the job. One of the police officers stated:

> With respect to standardization, the different practices become extinguished in 81 provinces of Turkey.
>
> Belli bir standart yakalama konusunda Türkiye çapında 81 ildeki farklı uygulamalar ortadan kalkmış olur.

Making job easier

The interviews showed that the EPSS would make the job easier in several ways. Some of the interviewed police officers (n = 3) stated that the EPSS would simplify the tasks on the job because they would make the tasks effortless. Two of the interviewed police officers also indicated that automating some tasks (e.g., generating reports, data input) would facilitate their jobs.

In addition to these dominating themes, the interviewed police officers emphasized the other benefits of the EPSS. They include:

- Using EPSS would result in saving on office supplies such as paper. (n = 5)
- Through the EPSS, the police officers would have more control over the work because they could monitor their progress in the work. (n = 4)
- The EPSS would improve the quality of work in terms of reports and procedures. (n = 3)
- The EPSS would store and transform the data in the Crime Scene Investigation and Identification Units. (n = 3)

In Figure 4.4, the concept map illustrates the main themes and their associated codes regarding the usefulness of the EPSS.

4.2.2. What Do the Police Officers Consider When They Judge the Usefulness of the EPSS? (Research Question 2)

The analysis of the interviews showed that the factors considered for the perceived usefulness of the EPSS could be covered under three basic themes: (1) user personal characteristics, (2) system characteristics, and (3) organizational characteristics.

User Personal characteristics

The interviewed police officers stressed many personal characteristics which had an impact on their perceptions related to the usefulness of the EPSS. Most of them (n = 7) focused on computer literacy. They stated that although many of them have adequate knowledge and skills to use computers, it is necessary to be computer literate in order to benefit from the EPSS effectively. One of them said:

> At least I should be able to use a computer. Of course, it is essential. Anyway if you are not a computer literate, you cannot use this system.
>
> En azından bilgisayarı kullanabilmen lazım. Tabii ki o şart. Zaten okur yazar olmazsan bu sistemi kullanamazsın.

Also, seven of the interviewed police officers addressed the effect of the system experience on their perceptions of usefulness of the EPSS. They noted that the more experience they had with the system, the more benefit they would get from it. One of the police officers said:

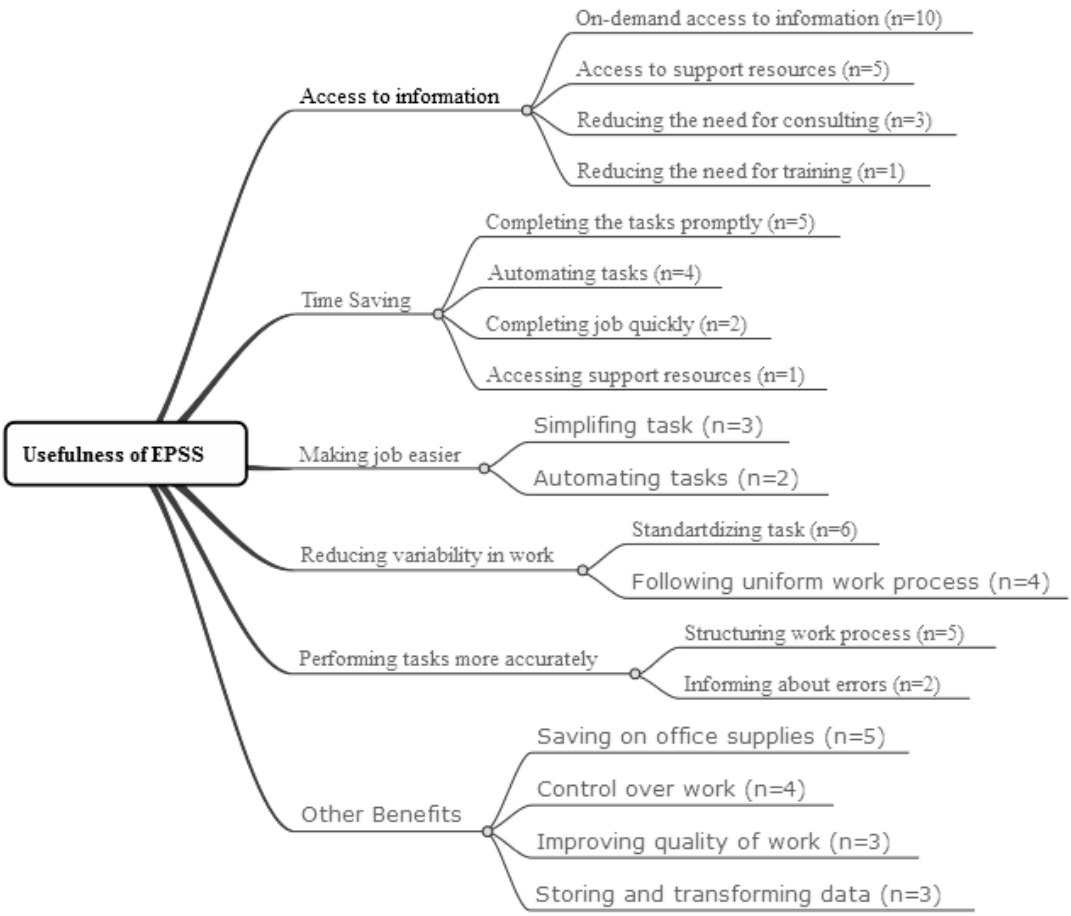


Figure 4.4 The perceived usefulness of the EPSS

> I think it will be better as [the system] is used. In general, I have seen this in the crime scene investigation teams. There will be some problems in [the system] usage. That will be overcome as it is used."
>
> [Sistemi] kullandıkça çok daha iyi olacağını düşünüyorum. Genel olarak [olay yeri inceleme] ekipler[in]de de az çok gördüm ben. [Sistemin] kullanımda bazı aksaklıklar çıkacak. Oda kullandıkça aşılacaktır.

Moreover, some of the interviewees (n = 3) underlined importance of anxiety about using the system in the perceived usefulness of it. One of them stated:

> Because we have just started to use the system, we have a little anxiety to avoid making any mistakes. However, as a computer user, I do not have any anxiety. I think some of my coworkers have that kind of anxiety because they do not how to use the computer well. Anyone has anxiety about anything he or she does not know.
>
> Şimdi ilk girdiğimiz için biraz haliyle hata yapmamak için bunun verdiği bir korku var. Ben bilgisayar kullanan birisi olarak tırsmıyorum bundan ama. Bazı

> arkadaşlarda bu korku var yani çünkü [bilgisayar kullanmayı] bilmiyor. Bilinmeyen her şeyden insan korkar.

Furthermore, some of the police officers (n = 3) stressed role of users' enjoyment from using the system in the usefulness of the EPSS. One of them said:

> In addition to ability to use the computer, at same time it is necessary for users to get enjoyment from using the computer.
>
> Bilgisayarı kullanma becerisinin olmasının yanında aynı zamanda bilgisayarın karşısında vakit geçirmenin de eğlenceli hale gelmesi lazım, o insan için.

Lastly, two of the police officers indicated that their motivation to use the system was important for the usefulness of the EPSS because if they were not enthusiastic and willing to use the system, they would not use it effectively.

System characteristics

The analysis of the interviews indicated several system characteristics affecting the perceived usefulness of the EPSS. The majority of the interviewed police officers focused on the role of the performance support facilities in the usefulness of the EPSS. Four of them stated that the EPSS would provide a convenient way to access and use the data they needed. Moreover, four of the police officers noted that the EPSS would provide step-by-step guidance for them to perform tasks effectively and successfully. Furthermore, three of the interviewees stated that the EPSS would provide access to information they need to perform the tasks successfully. Also, two of the police officers indicated the usefulness of automating job-related tasks. The police officers stated:

> (*) For example what I like the most [in the system] is the reporting component. … [Before the system], … something expressed in five lines could be one page, even one and half pages.
>
> (**) However, for a person who improves himself or herself, it evokes all information in a quick way. He or she will look at from there - it needs to be done in this way. Next time, he or she will say that "it is better when I do like that" so I think it become useful.
>
> (***) … [By using the system], you can make a change in reports. You cannot make any change on the report you wrote by hand. When we made a mistake, we have to write [the report] over again.

(*) Mesela benim [sistemde] en çok hoşuma giden rapor kısmı. ... [Sistemden önce] …beş satırlık bir şey bize bir sayfa, hatta bize bir buçuk sayfalara çıkıyordu.

(**) Ama kendisini geliştiren bir insan için bu bilgilerin hepsi çabuk bir şekilde hatırlatır. Hemen buradan bakacak - şu şekilde yapılması gerekiyormuş. Bir dahaki sefere ne olacak öyle yapıyorsam bak daha güzel oluyormuş diyerekten bence yararlı olur.

(***) … [Sistemi kullanarak] değişiklik yapabiliyorsun. Elle yazdığımız bir şeyin üzerinde değişiklik yapamıyorsun. Bir hata yaptığımızda [raporu] tekrar baştan yazmak zorundayız.

Furthermore, five of the police officers stressed importance of relevance of the system to the job. According to them, the EPSS well matched with their work procedures. One of them clearly said:

I mean if it is not relevant [to the job], we cannot say it is useful. Anyway, I think it is relevant to the job for each bureau.

Yani şimdi [işe] uygun olmazsa buna faydalı bir şey diyemeyiz. Yani işe uygun olduğunu düşünüyorum her büro için.

Moreover, four of the interviewed police officers emphasized the importance of the system complexity on the perceived usefulness of the EPSS. Some of them implied that some parts of the system overloaded them to the point that they could not realize the potential of the system. Also, four of the police officers highlighted the influence of the user interface design (e.g., layout, buttons, data input) on the usefulness of the system. Furthermore, four of the police officers stressed the importance of the usability of the mobile personal computers. Specifically, they noted that because of their small keyboards, the mobile personal computers made typing difficult for them and, in turn, decreased the usability and usefulness of the EPSS.

In terms of system characteristics, furthermore, three of the interviewed police officers focused on an impact of user-friendliness of the system on the perceived usefulness of the EPSS. They particularly focused on easy learnability of the system. In addition, three police officers pointed to the importance of the updates. They especially noted that the updates would fix problems or bugs, improve existing tools and resources, or add new functions and functionalities to the system.

Organizational characteristics

The results of the analysis showed that the organization (i.e., the Crime Scene Investigation and Identification Unit) would play an important role in the perceived usefulness of the EPSS. The majority of the interviewed police officers (n = 8) placed an emphasis on training offered for using the system. They stated:

> (*) However, when [the police officer] gets stuck, if he or she does not get training support, he or she may think 'I cannot use it anyway, I will also not be able to use it, and anyone does not care his or her own'. …However, I think training support is important until the system is adopted or runs well.
>
> (**) … a person with a little computer knowledge [can use the system] through a few days training, which absolutely needs to be given by a person who developed the system and know how to use it well.
>
> (***) … it is beneficial to give such training once in each six months. For example, how is it going? Is there any problem in the system? It would be beneficial for us.
>
> (*) Ama [polis memuru] kitlendiği yerde eğitim desteği de göremezse, zaten ben bunu kullanamıyorum, kullanamayacağım da, kimse de benimle ilgilenmiyor diye düşünebilir. ... Ama bu sistem oturuncaya kadar, sağlıklı çalışıncaya kadar eğitim desteği önemli bence.
>
> (**) … biraz bilgisayar bilgisi olan bir kişi, birkaç günlük bir eğitimle ki bu eğitimi mutlaka bu programları hazırlayan ve çok iyi bilen personel tarafından verilmesi gerekiyor, [sistemi kullanabilir.]
>
> (***) … şu verdiğiniz eğitimin biz atıyoruz, bunu altı ayda bir gelip tazelemekte fayda var. Mesela nasıl gidiyor eksik var mı? Bizim için faydalı olacak bunlar.

Moreover, six of the police officers expressed that information technology infrastructure (e.g., network, computer, computer hardware) should be improved in order for the system to be effective. One of them clearly stated:

> In the system, the organization should firstly support the technical infrastructure. It should support it with more computers.
>
> Sistemde şu olur kurumun önce teknik altyapı olarak desteklemesi lazım. Bilgisayar olarak desteklemesi lazım.

In addition, one of them said:

> In addition, problems in the pol-net [network] infrastructure could not be solved. Except for the pol-net [network] infrastructure, the computer specifications cannot support the pol-net. Computers have problems with hardware. It is required to support them.

> Artı buradaki pol-net [ağ] alt yapısındaki sıkıntılar çözülemiyor. Pol-net [ağ] yapısı harici, bilgisayarlar pol-neti kaldırmayabiliyor. Bilgisayarın donanım itibari ile sıkıntısı var. Onların desteklenmesi lazım.

In terms of organizational characteristics, two of the interviewees attached importance to end-user support. Also, two police officers underlined the importance of personnel management for effective use of the EPSS. In Figure 4.5, the main themes and their associated codes are illustrated in the concept map.

4.2.3. What Do the Police Officers Consider When They Judge the Ease of Use of the EPSS? (Research Question 3)

Similar to the perceived usefulness of the EPSS, the analysis of the interviews showed that the factors affecting perceived ease of use of the EPSS could be described under three basic themes: (1) user personal characteristics, (2) system characteristics, and (3) organizational characteristics.

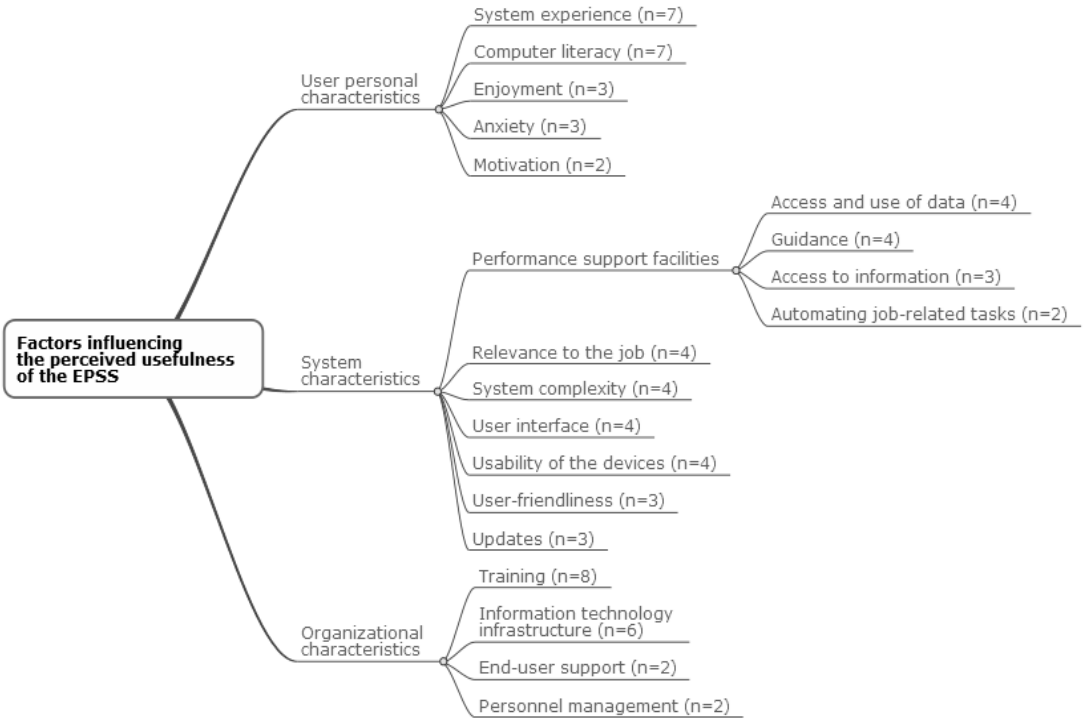


Figure 4.5 Factors influencing the perceived usefulness of the EPSS

User personal characteristics

The interviewed police officers drew attention to many personal characteristics which they considers when judging the ease of use of the EPSS. Many of them (n=6) stressed the importance of gaining more experience with the EPSS. They mainly believed that they would use the system more effectively with increased experience with it. One of them stated:

> Until putting the system into a practice, it seems to be difficult. Why? There is no any experience [with the system]. In practice, I would use the system in an effective way. … Now, we may have some hesitation [in using the system]. However, we can overcome it easily with the help of practice. We will think different one month later. I am sure for that
>
> Şuan için pratiğe dönene kadar biraz zor gibi geliyor. … Niye? [Sistem ile] pratik yok. Çünkü o zaman pratikte ne yapacağım ben, tak tak gideceksin. … Şimdi şöyle belki biraz insanda [system kullanımı ile ilgili] biraz tereddüt var. Ama pratikle biz bunu rahat rahat aşarız. Biz bir ay sonra çok farklı düşüneceğiz. Ben bundan eminim.

In addition, five of the interviewees placed emphasis on the effect of computer literacy on the ease of use of the EPSS. They clearly indicated that the police officers should have basic computer knowledge and skill to use the system in an effective and efficient way. One of them articulated:

> … in terms of personal characteristics, it is certainly necessary for a person who will use a computer, or … [the system], to have a computer background. You know, a non-computer literate person has difficulty in using the system."
>
> … kişisel bazda mutlaka bilgisayar yani ... [sistemi] kullanacak kişinin bilgisayar altyapısı olması kesinlikle gerekli. Yani bilgisayar bilmeyen birisi bunu çok zor kullanır.

In addition, two of the police officers focused on the influence of their voluntariness in the use of the EPSS. One of them noted that if a police officer was not eager to use the system, he did not enjoy using it in the job.

System characteristics

The interviewed police officers indicated that there were many system characteristics affecting the perceived ease of use of the EPSS. Most of them (n=9) placed emphasis on the user interface of the system. They mainly implied that the simplicity and

clarity of the system interface had an influence on the ease of use of the system. They said:

> (*) The interface of the system is very simple. … You should not read the label of the buttons in order not to understand [their functions]. All things are already written there.
>
> (**) What makes [the system] easy to use is that the menus are comprehensible [and] the transitions are easy.
>
> (*) Sistemin ara yüzü çok basit. … [İşlevlerini] Anlamamak için okumamak lazım tuşları. Hepsi orada yazıyor zaten.
>
> (**) [Sistemi] kolay yapan menülerin anlaşılır [ve] geçişlerin kolay olması.

In addition, four of the police officers stressed the critical role of user-friendliness in the ease of use of the system. They commonly indicated that a user with basic computer knowledge and skill could use the system easily. One of them clearly stated:

> … it is so a simple system that a person interested with computers can understand the functions of buttons by just looking its interface. Even if he cannot understand anything, it is so simple system that he can figure out the functions of buttons.
>
> … bilgisayar ile haşır neşir olan birisi en azından ara yüzüne bakarak, butonların ne işe yaradığını, bir şey anlamasa bile oradan çıkartacak kadar basit bir program.

Furthermore, some of the interviewees (n = 3) focused on simplified data entry. They noted that the system enabled them to enter data mainly by selecting a value from a specified list of choices, rather than typing. One of them articulated:

> This [system] is in a computer. Besides, in the new system, I will use mouse. I mean because there is no so much typing, it is easy to use [the system].
>
> Bu [sistem] bilgisayarda. Bir de şimdi yeni programda mouse ile tık tık. Yani fazla yazı yazmada olamadığı için bir yönden de [sistemin] bir güzel kolaylığı da var yani.

In terms of the perceived ease of use of the EPSS, two of the police officers emphasized the importance of relevance of the system to the job. Especially, the police officers in the Crime Scene Investigation Bureaus indicated that high relevance of the wizard to their work practices would make their interaction with the system

easy. Also, two of the interviewees stressed that the low usability of the mobile personal computers might hinder them to use the system easily.

Organizational characteristics

In terms of the effect of organizational characteristics on the perceived ease of using the system, two issues come to prominence: (1) information technology infrastructure and (2) training and support. Firstly, many of the interviewed police officers (n=7) stressed the demand for the improvement of information technology infrastructure in terms of network, computer, and hardware. One of them clearly stated:

> In terms of ease of use, we had experienced some difficulties [in using the system]. Before [the trainers] come here, we got some notice which says "prepare your computers and connect them to pol-net [network]". … The configuration of our computers is very low. They are too old.
>
> Kullanım kolaylığı bakımından [systemin kullanımında] sıkıntı yaşadık. [Eğitmenler] gelmeden once, cihazlarınız hazırlansın, pol-net [ağ] bağlantısı yapılsın şeklinde haberler gelmiş … Belki biraz önce gördünüz, bilgisayarlarımızın ayarları çok düşük. Eski bilgisayarlarımız.

In addition, many of the interviewees focused on training and support. Six of them mainly indicated the importance of training in enhancing their understanding of the system. One of them said:

> Firstly, for instance, I am a person who is more or less interested with information technology. I know how to use a computer. I am a person who can use these systems. However, when I just started to use the system I have absolutely a need for a support [to use it]. I mean, I found something [in the system] complex.
>
> Ama ilk etapta mesela ben bilişimi iyi kötü takip eden bir insanım. Bilgisayarı bilen bir insanım. Bu programları kullanabilen bir insanım. Ama ilk oturduğumda mutlaka [kullanmak için] bir desteğe ihtiyaç duyuyorum. Yani [sistemde] bazı şeyler biraz karmaşık geldi.

In addition to training, the police officers emphasized the influence of help systems (n = 1), peer support (n = 1), and technical support (n = 1) on the perceived ease of use of the system. In Figure 4.6, the main themes and their associated codes are shown in the concept map.

4.2.4. What Conditions Do the Police Officers Consider to Facilitate the Acceptance of the EPSS? (Research Question 4)

The interviewed police officers suggested four conditions that could lead to greater acceptance of the EPSS. They consisted of a set of support, organizational, environmental, and other conditions.

Support conditions

Some of the interviewees (n=3) proposed end-user support as one of the most important conditions for the acceptance and success of the system. They clearly indicated that end-user support would assist them in using the system effectively. One of them stated

> We need to easily contact with … [a support personnel] in some way. I think [using the system] will be easier in this way.
>
> Bizim mutlaka bir şekilde bir kanalla … [destek personeline] rahatlıkla ulaşabilmemiz lazım. Bu şekilde ben [sistemin kullanımının] kolaylaşacağını düşünüyorum.

In addition to end-user support, two of the police officers stressed the importance of

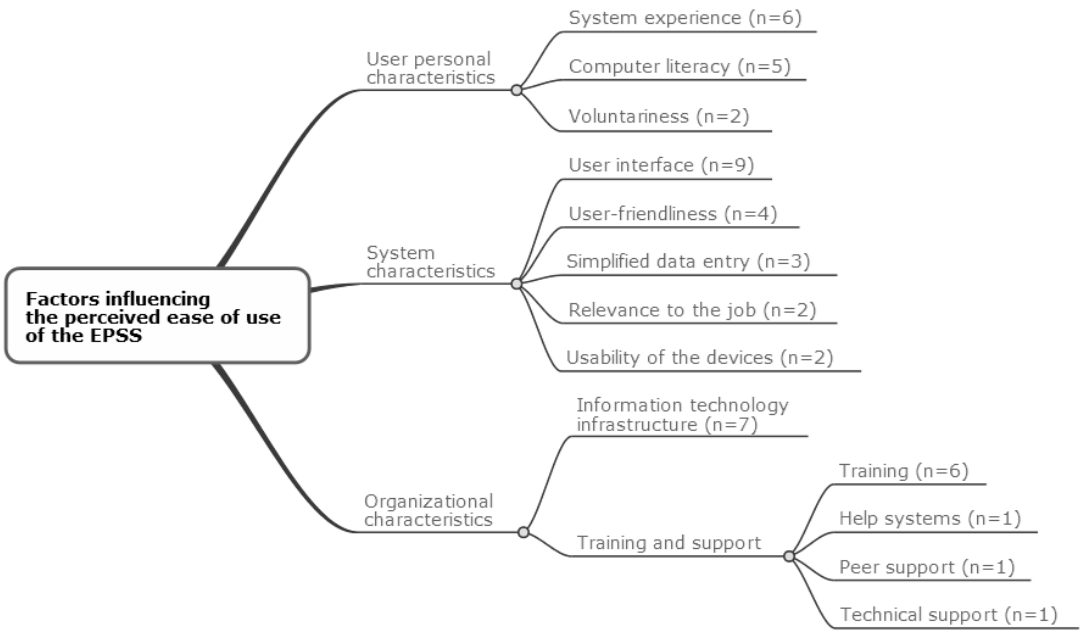


Figure 4.6 Factors influencing the perceived ease of use of the EPSS

training in facilitating adoption and use of the system.

Organizational conditions

Some police officers (n=3) put emphasis on the critical role of updates that address existing problems and requirements in the system. They stated that certain modifications in the system would influence their system use. One police officer said:

> There are some failures which we realized during using the system or a set of functions which we want to be included in the system. We convey them via the general directorate. They probably talk with [the designers] about them. Then, updates related to these issues are brought into agenda in the meetings. We will see them in the new version of the system. [The system] can run like that.
>
> Yani bu işte uygulama esnasında çıkan bizim gördüğümüz aksaklıklar ya da olmasını istediğimiz konular var. Bunları biz iletiyoruz, genel müdürlük vasıtası ile. Bunlarda [tasarımcılara] ulaşıyor muhtemelen. Ondan sonra toplantılarda gündeme gelen bu maddeler ile ilgili düzenlemeler ile versiyon değiştirdikçe göreceğiz bunu. [Sistem] bu şekilde yürüyebilir.

Also, three of the interviewees indicated that personnel management would play an important role in the acceptance of the system. With respect to personnel management, they mainly focused on the number of police officers in each bureau and their competence in using the system. One of police officers in the Crime Scene Investigation Bureau stated:

> It is related to our own personnel planning. I think that there should be much more personnel. I think crime scene investigation teams should be at least three personnel in order to use the system in a comfortable way. Our organizational opportunities should allow this to make using the system easy. They should have three people. I think the number of crime scene investigation teams should be enough.
>
> O bizim kendi tarz şeyimizle alakalı, personel planlamamızla alakalı. Yani fazla fazla olması lazım, en azından ekiplerin 3 kişi olması lazım bence, rahat kullanabilmesi için. Kurumsal olanaklarınızın buna el vermesi lazım ki kolaylaştırsın. Üç kişi olması lazım, yani ekip sayısının yeterli olması lazım bence, Olay yeri inceleme ekipleri için bence.

Also, two police officers underlined the importance of improving the information technology infrastructure in the success of the system.

Environmental conditions

Three of the interviewed police officers underlined the effect of peer influence on the acceptance of the EPSS. They believed that they might gain insight from the coworkers on the system. One of the police officers in the Crime Scene Investigation Bureau stated:

> Here is like a manufacture. I give [the evidences] to the Evidence Protection Bureau, then it deliver them to the Biometric Data Processing Bureau, AFIS, or others. Anyway, because all things are integrated with each other, like a manufacture, we want them [the police officers in all bureau] to use technology.
>
> Burası fabrika gibi bir yer burası. Ben [bulguları] götürüyorum, yazıyorum delil odası, delil odası dağıtımı yapıyor bilmem parmak izcisi, AFIS bilemem nesi şusu busu. Zaten hepsi bir biri ile iç içe girdiği için fabrika usulü olduğu için mecburen onlarında [bütün bürolardaki polislerin] teknolojiyi kullanmasını hepsini isteriz.

In addition, two of the interviewees focused on the effect of early adopters on other police officers in terms of system use. Some of the police officers (n=2) also stressed the role of support and guidance of superiors in fostering the acceptance of the system.

Other conditions

Two of the interviewed police officers indicated that gaining more experience with the system could enhance its acceptance. Moreover, some of the interviewed police officers (n = 2) emphasized that the benefits of using the system could foster use of the system. Figure 4.7 illustrates the themes and their associated codes related to conditions that facilitate the acceptance of the system.

4.3. Summary

This chapter presents the findings of quantitative and qualitative analyses. The findings of the quantitative analysis showed that all of the hypotheses proposed in TAM were supported. The police officers' perceptions of usefulness and ease of use of the EPSS had a significant positive effect on their attitudes toward using the system. Their attitude had a significant positive effect on their behavioral intentions to use the EPSS. The police officers' perceptions of usefulness had also a positive

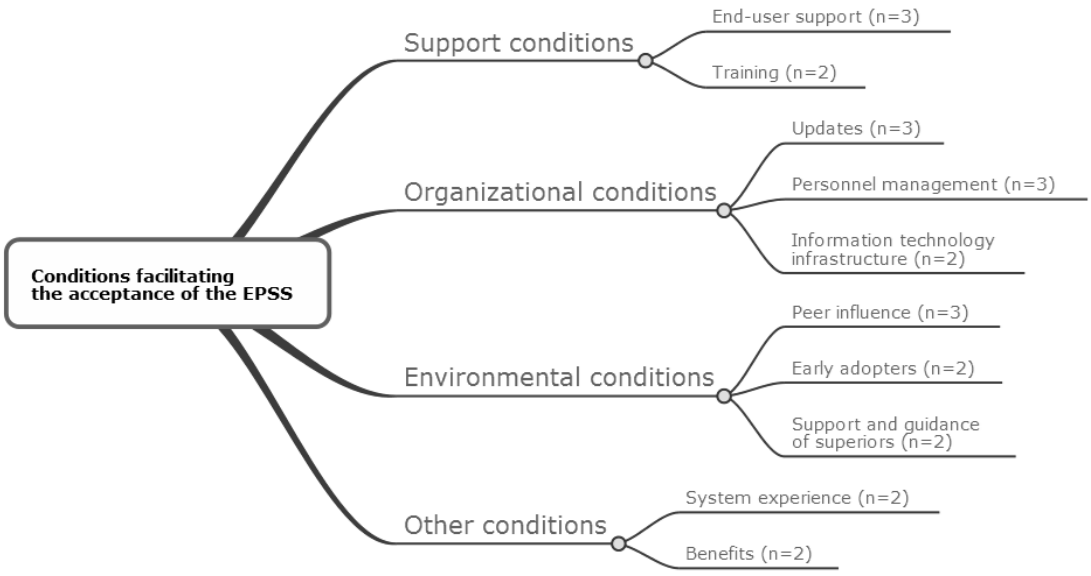


Figure 4.7 Conditions facilitating the acceptance of the EPSS

effect on their behavioral intentions to use the EPSS. The findings of the qualitative analysis indicated that police officers perceived the EPSS as useful due to access to information, time saving, performing tasks more accurately, reducing variability in job, making job easier, and other benefits of the EPSS. Moreover, the qualitative findings revealed several user personal, system, and organizational characteristics which the police officers considered to influence their perceptions of usefulness and ease of use of the EPSS. In addition, the findings of the qualitative analysis presented four conditions facilitating the acceptance of the EPSS, including support, organizational, environmental, and other conditions.

CHAPTER V

DISCUSSION

This chapter highlights the major findings of the study and explains their meaning and importance in the light of related literature. Moreover, it discusses the implications of the findings and makes some suggestions for both research and practice, where appropriate. Lastly, it explains the implications for future studies associated with the current research.

5.1. Summary

This partially mixed concurrent equal status design research was conducted to investigate the acceptance of the EPSS that enables the police officers to perform job-related tasks in the Crime Scene Investigation and Identification Units of the Turkish National Police. The quantitative phase of the study aimed to explain user acceptance of the EPSS by examining the hypothesized relationships in TAM. The questionnaire was used to collect data from 209 police officers in the Crime Scene Investigation and Identification Units of six provinces of Turkey. To assess validity of the hypothesized relationships, two-stage SEM was used. Before SEM analysis, the preliminary analyses were conducted to test several assumptions, including sample size, missing data, multivariate outliers, multivariate normality, and multicollinearity. In SEM analysis, the structural model was tested after assessment of the measurement model. In the model evaluation, χ^2 test, df, normed χ^2, CFI, and RMSEA model fit indices were used.

The qualitative phase of the study was intended to obtain deep insights regarding users' perceptions related to the usefulness and ease of use of the EPSS, and to explore conditions that facilitate the acceptance of the EPSS. The one-on-one interviews were conducted with 15 police officers that were selected with an intensity sampling strategy. After the interviews, the researcher transcribed all of the records and conducted the qualitative content analysis based on the framework offered by

Creswell's (2007). After analysis of the qualitative data, thick descriptions, direct quotations, and concept maps were used to report the qualitative findings.

5.2. The Major Findings of the Study

This part of the chapter underlines important findings of the study and shares their meaning and importance for EPSS acceptance. Firstly, it discusses the results concerning TAM. Secondly, it reviews the police officers' perceptions of usefulness of the EPSS in the light of related literature. Thirdly, this part discusses the factors considered to influence the usefulness and ease of use of the EPSS. Lastly, it focuses on the conditions facilitating the acceptance of the EPSS.

5.2.1. The Technology Acceptance Model

Overall, the results of the SEM analysis showed that all of the hypotheses proposed in TAM are supported (Table 5.1). Similar to the major TAM studies (Davis, 1989, 1993; Davis et al., 1989), this study shows that perceived usefulness, perceived ease of use, and attitude toward using play an important role in users' intentions to use the EPSS. Perceived usefulness positively influences behavioral intention to use the EPSS. Perceived ease of use positively influences perceived usefulness. Moreover, perceived usefulness and perceived ease of use positively influence attitude toward

Table 5.1

The Results of Hypotheses Testing

Hypotheses	Result
H1: The police officers' perceptions of usefulness significantly and positively influence their behavioral intentions to use the EPSS.	Accepted
H2: The police officers' perceptions of usefulness significantly and positively influence their attitudes toward using the EPSS	Accepted
H3: The police officers' perceptions of ease of use significantly and positively influence their perceived usefulness of the EPSS.	Accepted
H4: The police officers' perceptions of ease of use significantly and positively influence their attitudes toward using the EPSS.	Accepted
H5: The police officers' attitudes toward use significantly and positively influence their behavioral intentions to use the EPSS.	Accepted

using the EPSS. At the same time, perceived ease of use indirectly influences intention to use the EPSS through its direct influence on perceived usefulness and attitude. Attitude toward using the EPSS positively influences behavioral intention to use it. The following part discusses the results related to each hypothesis in a detailed way.

Research Hypothesis 1: The police officers' perceptions of usefulness significantly and positively influence their behavioral intentions to use the EPSS

The present research findings indicated that the police officers' beliefs about the usefulness of the EPSS significantly and positively influenced their intentions to use it. Users' decisions about the adoption of EPSSs are based on whether they help users to be successful (Laffey, 1995). If an EPSS does not result in successful job performance, people are less likely to use it (Nguyen, 2012; Nguyen et al., 2005). Collis and Verwijs (1995) indicate that usefulness is one of the variables that are most likely to influence users' decisions about acceptance of an EPSS. Nguyen (2010, 2012) also indicates that adoption of an EPSS is based on awareness of employees about the system, its advantages, and how to use it in the job. Similarly, Hung and Chao (2007) found a strong relationship between users' perceptions regarding overall usefulness and their willingness to adopt the EPSS. Moreover, van Schaik, Pearson, and Barker's (2002) study confirmed the relationship between the perceived usefulness of, and intention to use the EPSS. Habelow (2000) also revealed that perceived usefulness was one of the best predictors of EPSS usage. In addition, Chang (2004) found that there was a positive relationship between the perceived usefulness and acceptability of the EPSS. As a result, this study suggests that people are more likely to use an EPSS when they believe that its functionalities and features will enhance their job performance.

The findings also showed that perceived usefulness had a greater influence on the police officers' intentions to use the EPSS than perceived ease of use. With respect to ease of use, the user interface is an important component of an EPSS because it determines how people interact and navigate through the system. If the user interface is not designed appropriately, it may cause people to have frustration and cognitive

overload. Therefore, most authors have stressed the importance of the user interface in effectiveness of EPSSs (Barker & Banerji, 1995; Cagiltay, 2006; Gery, 1991; Laffey, 1995; Milhelm, 1997; Witt & Wager, 1994). However, Nguyen (2012) advocates that "[e]ven if a performer is able to quickly locate the information he requires for task performance, if that information is not correct, the performer will likely be unable to perform the task correctly, thereby driving down confidence and future use of the system" (p.153). As a consequence, although perceived ease of use encourages people to use an EPSS, perceived usefulness is a primary consideration for usage intention.

Research Hypothesis 2: The police officers' perceptions of usefulness significantly and positively influence their attitudes toward using the EPSS

The findings indicated that perceived usefulness significantly and positively influenced the police officers' attitude toward using the EPSS. This result shows that people's beliefs about the usefulness of the EPSS influence their feelings about using it. Similar to this finding, Moore and Orey (2000) found that the users' performance had an effect on their attitude toward the EPSS as well as toward technology in general. In their study, teachers were motivated to use the performance support tools due to their improved performance. In addition, in the present study, a closer examination of the findings showed that the influence of perceived usefulness on attitude toward using the EPSS was greater than that of perceived ease of use. Therefore, perceived usefulness is relatively more important for attitude toward EPSS use. As a result, this study suggests that positively valued results of using an EPSS (e.g., increasing effectiveness, productivity, and performance) are likely to result in a positive attitude toward it.

Research Hypothesis 3: The police officers' perceptions of ease of use significantly and positively influence their perceived usefulness of the EPSS

The present research findings showed that perceived ease of use significantly and positively influenced the police officers' perceptions regarding the usefulness of the EPSS. This result indicates that the more people perceive the system components as easy to use, the more they perceive the EPSS as useful. Unless an EPSS is easy to use, people may require more time to find information they need, make more errors,

and need more effort to complete tasks with the system, which jeopardizes task performance in turn. This finding is supported by Habelow (2000) who found a significant positive relationship between perceived usefulness and perceived ease of use of the EPSS specifically designed for the job of the banking associate. In the same vein, Gery (1991) contends that "if [the user interface of an EPSS] is inadequate, unclear, or too complex, the power of the underlying system is essentially irrelevant" (p. 44). Thus, this study suggests that ease of use of an EPSS helps people to be more productive and effective in their job.

In addition, the findings demonstrated that the perceived ease of use indirectly influenced the police officers' intentions to use the EPSS through perceived usefulness and attitude toward using it. The perceived usefulness was found to account more for the indirect influence of perceived ease of use on the intention to use the EPSS. Similarly, Davis (1993) indicates that perceived ease of use principally functions through perceived usefulness. This result suggests that the more people perceive an EPSS as easy to use, the more they perceive it as useful, and the more they are likely to use it.

Research Hypothesis 4: The police officers' perceptions of ease of use significantly and positively influence their attitudes toward using the EPSS

The findings indicated that the perceived ease of use significantly and positively influenced the police officers' attitude toward using the EPSS. This result shows that individuals' beliefs about the ease of use of system components influence their feelings toward using the EPSS. Davis et al. (1989) state that the ease of use of a system leads users to have high self-efficacy to use it and, in turn, influences their attitude toward it. In other words, when a system is easy to use, users have more confidence to use it. Similarly, the way people interact with, and navigate through an EPSS influences how they feel about using it (Stevens & Stevens, 1995). The relationship between perceived ease of use and attitude toward using computers is supported by Habelow (2000). Therefore, this study suggests that an ease of interaction or navigation in an EPSS may improve individuals' attitudes toward using it.

Research Hypothesis 5: The police officers' attitudes toward use significantly and positively influence their behavioral intentions to use the EPSS

The findings from the present study indicated that the police officers' positive or negative evaluations of using the EPSS significantly influenced their intentions to use it. In general, attitude toward a particular behavior plays an important role in determining an individual's intention to perform it (Ajzen & Fishbein, 1980). In the innovation-decision model, Rogers (2003) also indicates that individuals' choices to adopt or reject an innovation are usually consistent with their attitudes. Similarly, people's attitudes toward using an information system influence their intention to use it. The role of attitude in TAM depends on the influence of the beliefs on intention and type of use setting (i.e. mandatory or volitional) (Yousafzai et al., 2007a). The relationship between attitude and behavioral intention is validated in many past studies (Mathieson, Peacock, & Chin, 2001; Luan & Teo, 2011). Similarly, the study conducted by Gal and Nachmias (2012) confirmed a strong positive relationship between users' attitudes toward the EPSS and their willingness to use it in the future. Therefore, this study suggests that users' feelings associated with using an EPSS influence their intention to use it.

5.2.2. What Makes the EPSS Useful for the Police Officers? (Research Question 1)

Based on the accumulated evidence, it is clear that perceived usefulness is a critical to the acceptance of the EPSS. This study suggests that perceived usefulness of the EPSS plays a more important role in the acceptance and effective utilization of the system. Descriptive analysis of the quantitative data showed that the police officers mainly agree with the usefulness of the EPSS in terms of working more quickly, job performance, increasing productivity, and making a job easier. In addition, the results of the qualitative analysis help gain more insight about the usefulness of the EPSS.

Most of the participants clearly expressed that the EPSS would provide ready access to information needed to accomplish the job-related tasks. Actually, one of the basic goals of an EPSS is to enable people to easily access resources and information necessary to perform tasks successfully (Gery, 2002; McKay & Wager, 2007; Nguyen, 2012). Chang (2004) found that the data/information base component of the EPSS

was one of the components that makes the greatest contribution to overall benefit of EPSS use. In the present study, the EPSS delivers information in different structures and detail through the context-sensitive support system and the content management system. The EPSS was specifically designed to provide the right information, at the right time, in the right form. Working in such an information-rich environment may contribute to productivity and worker autonomy in organizations because people use information not only to perform the tasks but also to improve their performance with minimal support from others (Altalib, 2002; Desmarais et al., 1997).

The participants also thought that the EPSS would reduce the time required to perform the tasks and access the support resources. In this study, the EPSS were specifically designed to provide the police officers with performance support tools, resources, and information to accomplish the task at hand successfully and quickly. The context-sensitive support system and the content management system give the police officers an easy and quick means to reach support resources. The extrinsic and intrinsic performance support systems are integrated with the work context, which allows providing the appropriate support information. Users perform their tasks faster and more effectively because EPSS environments are integrated with work processes (Van Tiem, Moseley, & Dessinger, 2001). Similarly, previous studies confirm that EPSSs enable users to save time in performing tasks (Moore & Orey, 2000; Nguyen & Klein, 2008; Paschal, 2004). In addition to time-on-task, Hawkins, Gustafson, and Nielsen's (1998) study showed that EPSS use reduce overtime, time to get help from supervision or co-workers, and "down" time. Due to EPSS use, saved time may enable users to accomplish more work in the same amount of time or allocate more time for important tasks.

In addition, the participants indicated that the EPSS would enable the police officers to perform the tasks in a more accurate way. EPSSs guide users through correct and effective procedures for tasks (van Schaik, 2010). Similarly, in the current study, the EPSS was designed to guide the police officers in their particular tasks and inform them about the mistakes. This leads the police officers to follow correct and effective procedures in the job-related tasks. Nguyen and Klein (2008) supported this finding, and showed that the users who received the EPSS performed the task more accurately than their training-only counterparts. In addition, Moore and Orey (2000)

indicated that the EPSS use made teachers more efficient in the job-related tasks. High accuracy in task performance is likely to make an improvement in the quality of final products.

Also, the participants suggested that the EPSS would reduce variability in their work practices. In this study, the EPSS was designed such that all of the police officers in the Crime Scene Investigation and Identification Units had access to the same information, resources, and tools to perform a particular task. Therefore, the police officers would benefit from uniform producers and information associated with the tasks. Uniform work practices improve quality (Van Tiem et al., 2001) and reduce variability in work practices (Desmarais et al., 1997; Villachica et al., 2006). EPSSs could improve effectiveness by providing uniform procedures and information for users to perform tasks because the quality of task performance becomes less dependent on the capabilities of employees.

Lastly, the participants' responses indicated that the EPSS would make complex tasks easier. In this study, the EPSS was designed to include tools which make some tasks (e.g., preparing reports, investigating a crime scene, controlling workflow) simple for the police officers. It provides conceptual, procedural, and strategic scaffoldings for users to accomplish particular tasks. In line with this finding, Rosenberg (2006) states that EPSSs make work simpler by taking complexity out of work processes and tools and reducing the level of skill needed for a task. Therefore, these systems help individuals to accomplish complex tasks easily.

5.2.3. What Do the Police Officers Consider When They Judge the Usefulness and Ease of Use of the EPSS? (Research Question 2 & 3)

In this study, perceived usefulness had both a direct and indirect effect on the police officers' intentions to use the EPSS. At the same time, perceived ease of use influences the police officers' intentions to use the EPSS through its effect on both perceived usefulness and attitude toward using it. Therefore, similar to TAM (Davis, 1989; Davis et al., 1989), the findings of this study revealed that perceived usefulness and perceived ease of use were two important beliefs which influence the acceptance of the EPSS. Therefore, it is noteworthy to have insight into the factors that are considered important for the perceived usefulness and perceived ease of the EPSS.

Table 5.2

The Factors Contributing to or Hindering Perceived Usefulness and Perceived Ease of Use of the EPSS

User Personal Characteristics	System Characteristics	Organizational Characteristics
▪ Computer literacy[ab] ▪ Enjoyment[a] ▪ Experience with the system[ab] ▪ Motivation[a] ▪ Anxiety[a] ▪ Voluntariness[b]	▪ Simplified data entry[b] ▪ Performance support facilities[a] ▪ Relevance to the job[ab] ▪ System complexity[a] ▪ Updates[a] ▪ Usability of the devices[ab] ▪ User friendliness[ab] ▪ User interface[ab]	▪ Information technology infrastructure[ab] ▪ Personnel management[a] ▪ Training[ab] ▪ Support Facilites[ab]

Note. [a] considered to influence perceived usefulness; [b] considered to influence perceived ease of use

This study suggested three common categories for the factors which play an important role in the perceived usefulness and perceived ease of use of the EPSS: (a) user personal characteristics, (b) system characteristics, and (c) organizational characteristics. The factors under each category helped the police officers develop favorable perceptions related to the usefulness and ease of use of the EPSS (Table 5.2). In the following part of this chapter, the factors under each category are discussed in a more detailed way.

(a) User Personal Characteristics

User personal characteristics refer to knowledge, skills, and psychological factors which contribute to the police officers' perceptions toward the usefulness and ease of use of the EPSS. As shown in Table 5.2, computer literacy, enjoyment, experience with the system, motivation, anxiety, and voluntariness were found to be important user personal characteristics that influence the perceived usefulness and perceived ease of use the EPSS.

Computer literacy. In terms of user personal characteristics, the participants stated that computer literacy had a prominent role in the usefulness and ease of use of the EPSS. Because the EPSS is a computer-based system, computer knowledge and skills

are necessary for the users to utilize the system effectively. Inability to use is an important source for user resistance to an EPSS (Gery, 1991). Paschall (2004) showed that the users were concerned with their ability to meet the demands of the performance support system. Due to a lack in computer literacy, users may have difficulty understanding the functionalities of an EPSS and using its functions.

Computer literacy is considered an indirect experience with the general technology that moderates the effect of perceived usefulness and perceived ease on acceptance of a specific technology (Sun & Zhang, 2006). Igbaria, Parasuraman, and Baroudi, (1996) found that computer skill positively influenced the perceived usefulness and perceived ease of use of the information system. Similarly, this study suggests that level of computer literacy is likely to influence the perceived usefulness and perceived ease of use of the performance support system.

In order to improve the users' perceptions regarding the usefulness and ease of use of the EPSS, it is important to specify what the users should know and be able to do with a computer to operate the system successfully. According to Certiport, a pioneering complete career-oriented certification provider worldwide, computer literacy covers (a) understanding computer hardware, software, operating systems, peripherals, and troubleshooting; (b) performing common program functions and using word processing, spreadsheet, and presentation applications; and (c) working in an internet or networked environment and using electronic communication and collaboration tools safely and ethically ("IC3 Certification Exam", 2012).

Motivation and enjoyment. The participants emphasized the influence of their intrinsic motivation on the perceived usefulness of the EPSS. While "extrinsic motivation" refers to "doing something because it leads to a separable outcome", "intrinsic motivation" refers to "doing something because it is inherently interesting or enjoyable" (Ryan & Deci, 2000, p. 55). Intrinsically motivated individuals tend to invest more time and effort in using a technology, which improves output quality and productivity (Venkatesh, Speier, & Morris, 2002). Similarly, in this study, the police officers' enthusiasm for using the EPSS is likely to enhance their performance on the tasks.

The previous studies have mainly operationalized intrinsic motivation as perceived enjoyment of using the system (Davis, Bagozzi, & Warshaw, 1992; Venkatesh et al., 2002; Venkatesh & Speier, 1999). Enjoyment refers to the extent to which users view using the system as enjoyable in its own right. As an example of intrinsic motivation, perceived enjoyment is also expected to have an impact on the perceived usefulness of the EPSS. The study conducted by Fagan, Neill, and Wooldridge (2008) found that perceived enjoyment was positively related to perceived usefulness. Likewise, in this study, the participants focused on the importance of enjoyment to the usefulness of the EPSS. Therefore, if using the EPSS is enjoyable, the users are likely to view it as potentially more useful.

As a conclusion, this study suggests that intrinsic motivation (in general) and enjoyment (in particular) are likely to influence perceived usefulness of the EPSS. When using an EPSS is interesting and enjoyable for users, they are more likely to perceive it as useful. The perceived usefulness of the system is associated with extrinsic motivation because it reflects the valued outcomes of using it (Davis et al., 1992; Fagan et al., 2008). Therefore, this finding also suggests that the users' pleasure and interest in using the EPSS have a relationship with extrinsic motivation. Intrinsic motivation to use the EPSS is more likely to enhance extrinsic motivation to use it.

Experience with the system. In this study, the participants underlined importance of experience with the EPSS in their perceptions regarding the usefulness and ease of use of it. The police officers mostly stated that with increased experience, they would not only use the EPSS more easily but also understand the potential of the EPSS. Therefore, the police officers' experiences with the system are likely to influence their perceptions related to the EPSS.

In general, experience with an information system has an important role in the formation of usefulness and ease of use perceptions. Past studies have provided enough evidence on the influence of experience on usefulness and ease of use perceptions (Hackbarth, Grover, & Yi, 2003; Igbaria, 1993; Igbaria, Guimarae, & Davis, 1995; Taylor & Todd, 1995b; Venkatesh & Davis, 1996; Xia & Lee, 2000). Moreover, individuals' perceptions may change as they acquire experience with the system over time. After experience with the system, system specific beliefs have a

greater effect on user perceptions (Venkatesh, 2000; Venkatesh & Davis, 1996). Therefore, with increased experience with an EPSS, individuals' perceptions are based on more tangible aspects of the system.

As a result, experience with the EPSS enables the users to develop their own understanding of the functions and functionalities of the system. In addition, they can acquire knowledge about the weaknesses and strengths of the EPSS. Chang (2004) found that years of experience in EPSS use makes an important contribution to the overall benefit of EPSS use. Experience with a performance support system leads individuals to rely on their own specific knowledge and beliefs about the EPSS in when evaluating its usefulness and ease of use.

Anxiety. The participants stressed the role of anxiety in their perceptions regarding the usefulness of the EPSS. Due to discomfort and fear of using the system, the police officers may not use the functionalities of the EPSS effectively and, subsequently, fail to attain desired consequences. Therefore, a high level of anxiety probably impairs the potential of the EPSS in improving job performance.

Anxiety toward computer systems is negatively related to perceived ease of use (Hackbarth et al., 2003; Venkatesh, 2000) and perceived usefulness (Igbaria, 1993; Roberts & Henderson, 2000). In addition to general computer anxiety, application-specific anxiety is also expected to have an influence on acceptance or utilization of information systems. However, past studies did not find a significant influence of application-specific anxiety on the perceived usefulness of the application (Hasan & Ahmet, 2010; Mohamed & Karim, 2012). Application-specific anxiety has an indirect impact on usefulness perception through its direct effect on application-specific self-efficacy.

This study suggests that anxiety about using the EPSS is likely to play an important role on the users' perceptions regarding the usefulness of the system. However, because of inconclusive results in past studies, the role of anxiety in the perceived usefulness of the EPSS requires further investigation.

Voluntariness. This study indicates that voluntary use of the system is an important factor which influences perception regarding ease of use of the EPSS. Voluntariness

refers to the degree of free will which individuals have for using the system. It has a moderating role on the effect of perceived usefulness and perceived ease of use on behavioral intention (Wu & Lederer, 2009). When the level of voluntariness increases, the effect of usefulness and ease of use on intention become greater. Furthermore, Venkatesh and Davis (2000) found that perceived usefulness is the primary determinant of behavioral intention in both voluntary and mandatory settings. However, Brown, Massey, Montoya-Weiss, and Burkman (2002) indicated that perceived ease of use is the primary concern of the users in mandatory use environments.

Similarly, in this study, the participants implied that when usage was not voluntary, perceived ease of use might become a critical factor for the successful utilization of the EPSS because using it on the job might be perceived as effortful. Under conditions of voluntary use, individuals may tend to overlook difficulties in using the EPSS to benefit from it. Therefore, voluntariness is likely to have an impact on the users' beliefs about the ease of use of the EPSS.

(b) System Characteristics

System characteristics are associated with the functions and functionalities of the EPSS that influence the police officers' perceptions of usefulness and ease of use. As shown in Table 5.2, simplified data entry, performance support facilities, relevance to the job, system complexity, updates, usability of the devices, user friendliness, and user interface are system characteristics that the police officers are likely to consider when judging the usefulness and ease of use of the EPSS.

Simplified Data Entry. The participants noted that a simplified process for entering data was an important factor that contributes to perceived ease of use of the EPSS. As indicated by Stevens and Stevens (1995), EPSSs do not only include simple information access tools, they may have features that enable users to input and manipulate data. Therefore, if the data entry process is made simple, users save more time and effort in using an EPSS.

In this study, instead of typing values, the police officers are mainly required to select values from a list of choices in order to input data into the EPSS, especially the

wizard. The simplified data entry process is likely to save the police officers' efforts and time when they complete the tasks. Therefore, this study suggests that a simplified process for data entry is likely to contribute to the ease of use of the EPSS.

Performance Support Facilities. In this study, the performance support facilities were found to be an important factor in the police officers' judgment on the usefulness of the EPSS. The EPSS consisted of intrinsic, extrinsic, and external support systems that were specifically designed to contribute to the police officers' performance. The police officers particularly highlighted three functionalities of the EPSS: data access and use, guiding, and the automation of job-related tasks. As stated previously in this chapter, these features and functions are likely to contribute to perceived usefulness of the EPSS with respect to information access, time saving, accuracy in performance, reduction of variability in work practices, and ease of work. In addition, plenty of past studies have shown the effectiveness of performance support systems in supporting task performance (Bastiaens et al., 1997; Gal & Nachmias, 2011; Nguyen & Klein, 2008; Nguyen et al., 2005). The relative advantage of a proposed intervention is an important characteristic that has a significant impact on users' perceptions (Rogers, 2003). Therefore, as expected, performance support features and functions of the system are important considerations for the police officers to take into account when evaluating the usefulness of the EPSS. The performance support facilities are likely to improve the users' beliefs about the degree to which the EPSS enhances their job performance.

Relevance to the job. With respect to system characteristics, the participants also emphasized the importance of job relevance of the EPSS in their perceptions regarding usefulness and ease of use. The police officers indicated that the applicability of the EPSS to the work practices is an important consideration for their judgments on its usefulness. Nguyen (2010) asserts that "performance support is only effective when it provides timely, relevant, and current content" (p. 337). If performance support systems are not relevant to task performance, individuals will unlikely be able to perform the task correctly. Most clearly, in TAM2, an extended model of TAM, job relevance is suggested as one of the cognitive instrumental determinants of the perceived usefulness of an information system (Venkatesh & Davis, 2000). Also, plenty of past studies have shown that job relevance positively

influences perceived usefulness (Hong, Thong, Wong, & Tam, 2001; Venkatesh & Bala, 2008; Venaktesh & Davis, 2000). Similarly, this study suggests that job relevance is likely to improve user perceptions associated with effectiveness of the EPSS in improving job performance.

In addition, the participants underlined the role of the job relevance on their perceptions regarding the ease of use of the EPSS. Having content highly relevant to users' information needs and work practice is likely to make the EPSS easy to interact. In such systems, individuals easily locate the information they need and do not need to make a major change in their current work practices. Similarly, Hong et al. (2001) found a direct relationship between relevance and perceived ease of use in the context of the acceptance of digital libraries. They explained that relevant content in the system helped users find the necessary information in an easy way, and influenced their beliefs about ease of use. On the contrary, Chau and Hu (2002) did not confirm the impact of compatibility on perceived ease of use in the context of acceptance of telemedicine technology. Although the past studies show mixed results on the effect of relevance on perceived ease of use, this study suggests that job relevance is likely to make interaction with the EPSS easy.

System Complexity. The findings demonstrated that the participants gave system complexity a considerable amount of importance when evaluating the usefulness of the EPSS. A complex task demands greater behavioral and information processing, and so the outcomes are less likely to be obtained (Chen, Casper, & Cortina, 2001) In a similar way, the difficulty in using an EPSS is likely to impair its valued outcomes. System complexity causes individuals to feel uncertain about the usefulness of a system. System complexity is quite parallel to perceived ease of use (Davis, 1989). Many past studies have showed a negative relationship between the system complexity and perceived usefulness of an information system (Igbaria et al., 1996; Hasan, 2007). Similarly, difficulty in understanding or using performance support systems is most likely to hinder their potential in improving job performance. Simplicity is the key to an effective EPSS. People give more value to the performance interventions which are easy to understand and use (Dormant, 1999). Therefore, this study suggests that difficulty in understanding or using the EPSS is likely to have an impact on the users' perceptions regarding its usefulness.

User Interface. The findings also showed that the participants' perceptions regarding usefulness and ease of use were sensitive to the user interface design of the EPSS. The police officers indicated that a well-designed and organized user interface would make the functions of the EPSS useful and easy to use. The user interface of a system specifies the way which users interact with it. It determines the skills which users need to use a system and the quality of outcomes which users obtain as a result of using a system (Barker, 2010a). Many past studies have confirmed an association between user interface design and users' perceptions regarding the usefulness and ease of use of the system (Cho, Cheng, & Lai, 2009; Ozen & Basoglu, 2007). In a similar way, this study suggests that user interface is likely to influence the usefulness and ease of use of a performance support system. The user interface is a key success factor for an EPSS (Rossett, 1996). It enables users to interact with the performance support components. In EPSSs, user interface can "communicate the meaning and use of screen objects and system functions", "minimize screen clutter", and "make the process of using the application easier for people" (Stevens & Stevens, 1995, p. 125). With a poorly designed user interface, users are not able to easily or quickly find and locate the required supports. In fact, Gery (1991) asserts that "[i]f it is inadequate, unclear, or too complex, the power of the underlying system is essentially irrelevant" (p. 44). Therefore, it is important to design the user interfaces of the EPSS in an adequate, clear, and simple way.

User Friendliness. In this study, the participants also placed a considerable emphasis on the importance of user friendliness in their perceptions regarding the usefulness and ease of use of the EPSS. According to Davis (1993), the user friendliness of a system is an important barrier for user acceptance and, therefore, designing the user interface in such a way that it is easy to use or learn to use is key to the effective utilization of information technologies. In their study, Liao, Landry, and Cheung (2003) also confirmed that user-friendliness influences perceived usefulness and perceived ease of use and, thereby, system success in the context of customer-based retail banking. Similarly, this study suggests that the level of user friendliness of the EPSS influences the users' perceptions regarding usefulness and ease of use. The goal of an EPSS is to support performers in order to accomplish the task effectively even when they do not know either the work or the software (Gery & Jezsik, 1999).

Creating a user friendly EPSS helps performers to use and understand its functions even when they have never use it before.

Updates. The participants also emphasized on the importance of updates to the system in their perceptions regarding the usefulness of the EPSS. Performance support systems are effective as long as the content of the system is timely, current, and relevant (Nguyen, 2010; 2012). Therefore, when the tasks or information are revised or new ones are added, the EPSS must be updated in order to keep the content of systems current and relevant. Otherwise, the EPSS is less likely to enable people to perform job-related tasks successfully. Thus, updates are likely to contribute to usefulness of the EPSS.

Usability of the Devices. The participants underlined the importance of the usability of the devices in both the perceived usefulness and perceived ease of use of the EPSS. In this study, the police officers put special emphasis on the deficiencies of the usability of the rugged mobile personal computers that provide access to the EPSS during crime scene investigations. They indicated that the inconvenience of keyboard operation in the mobile personal computers might threaten the usefulness and ease of use of the EPSS.

Although the unique features of mobile devices provide several benefits to users, they pose a number of challenges in terms of usability, including slow and unreliable connectivity, small screen size, low resolution, slow processing capability and power, and limitations in data entry (Zhang & Adipat, 2005). The usability of mobile devices has an impact on users' perceived usefulness and perceived ease of use (Li & Bai, 2011). In the same way, this study suggests that the deficiency of the usability of the mobile personal computers may make EPSS use difficult and hinder the potential for the system to improve job performance. Therefore, usability of mobile devices appears to be an important consideration for effective utilization of the EPSS.

(c) Organizational characteristics

Organizational characteristics include organizational activities and settings which improve the perceived usefulness and perceived ease of use of the EPSS. As shown in Table 5.2, the police officers considered information technology infrastructure,

personnel management, and training and support facilities when assessing the usefulness and ease of use of the EPSS.

Information Technology Infrastructure. In this study, the participants placed an emphasis on the role of information technology infrastructure (i.e., computers, hardware and network) in their perceptions regarding the usefulness and ease of use of the EPSS. In general, the information technology infrastructure is a critical organizational resource that influences the success of information technology implementation in organizations (Armstrong & Sambamurthy, 1999). Similarly, this study suggests that information technology infrastructure is likely to have an impact on the extent of the success and adoption of the EPSS. The creation of an information technology infrastructure poses a challenge for the successful utilization of an EPSS in an organization (Maughan, 2005, Nguyen, 2010, 2012; Rossett, 1996). When an information technology infrastructure is not adequate or appropriate for an EPSS, it does not work properly and performers are not able to access the required assistance in an appropriate way. Therefore, the information technology infrastructure is likely to influence users' perceptions associated with the usefulness and ease of use of the EPSS and, eventually, acceptance of the system. In other words, beliefs about the usefulness and ease of use of the EPSS are expected to be less positive when an existing information technology infrastructure is not sufficient for its effective use.

Personnel Management. The police officers stressed the importance of personnel management in terms of the usefulness of the EPSS. They particularly indicated that the bureaus in the Crime Scene Investigation and Identification Units need to have personnel in sufficient numbers (quantity) and adequate qualification (quality) for a successful adoption of the EPSS. Otherwise, because of work load density, the police officers could not invest enough time and effort to realize the potential of the EPSS. Therefore, successful personnel management is likely to be critical factor for the success of the EPSS.

Training. The participants underscored the role of training on their beliefs about the usefulness and ease of use of the EPSS. Training makes it possible for users to understand and use the functions of an information system effectively. Plenty of past

studies have suggested that training helps users to form favorable perceptions regarding the usefulness and ease of use of an information system (Igbaria et al., 1995; Venkatesh, 1999; Venkatesh & Bala, 2008). Similarly, many researchers underlined the importance of user training in the adoption of EPSSs (Gery, 1991; Nguyen, 2010, 2012; Nguyen & Woll, 2006). Gery (1991) argues that "it is desirable conduct orientation or training experiences on the EPSS itself so that individuals are proficient in its use and understand what's in it and how it benefits from personally." (p. 249). Training is an important factor for the effective utilization of an EPSS (Habelow, 2000; Moore & Orey, 2000). Therefore, training on EPSS use is most likely to influence the users' perceptions regarding the usefulness and ease of use of the EPSS.

Support Facilities. In addition to training, the participants underlined the importance of support facilities in enhancing their perceptions toward the EPSS. The findings showed that while end-user support was considered an important factor for the perceived usefulness of the EPSS, help systems, technical support, and peer support were regarded as factors contributing to the perceived ease of use of the EPSS. The availability of such support functionalities helps individuals overcome problems related to EPSS use which they encounter during usage and understand the potential of the EPSS in improving job performance. For example, Habelow (2000) found technical support as a significant predictor of EPSS usage. Similarly, many previous studies advocate that support facilities influence the perceived usefulness and perceived ease of use of an information system (Igbaria et al., 1995; Ngai, Poon, & Chan, 2007; Venkatesh & Bala, 2008). Therefore, this study proposes that support facilities are likely to contribute to performers' perceptions regarding the usefulness and ease of use of the EPSS.

In this study, although the police officers offered many different factors affecting their perceptions regarding the usefulness and ease of use of the EPSS, there are factors that are common for both. The common user personal characteristics include computer literacy and experience with the EPSS. The common system characteristics consist of the relevance of the system to the job, user friendliness, usability of the devices, and the user interface. Lastly, the common organizational characteristics involve the information technology infrastructure, training, and support facilities.

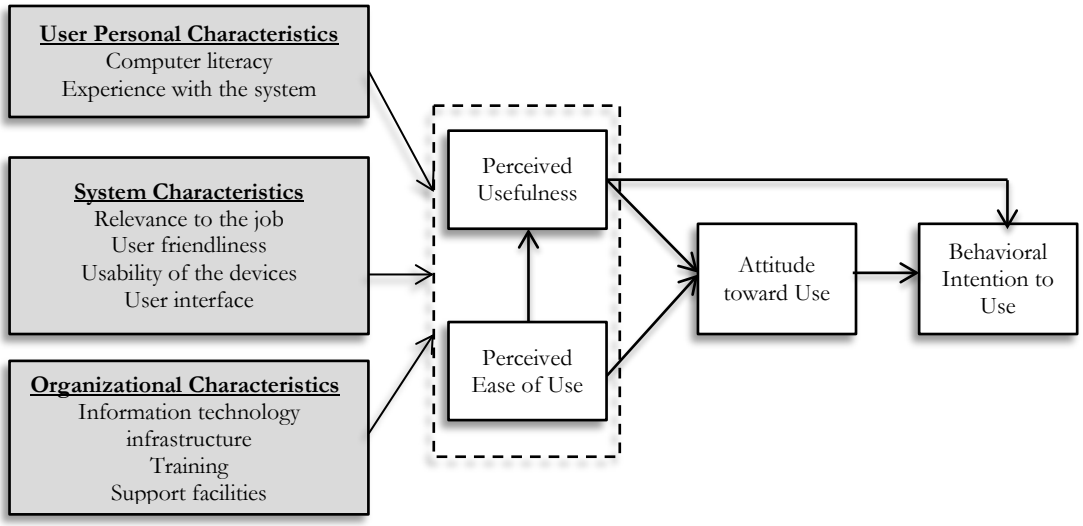


Figure 5.1 TAM with the common factors contributing to or hindering perceived usefulness and perceived ease of use of the EPSS

TAM with common factors affecting the perceived usefulness and perceived ease of use of the EPSS is illustrated in Figure 5.1.

5.2.4. What Conditions Do the Police Officers Consider to Facilitate the Acceptance of the EPSS? (Research Question 4)

This study suggested four important conditions facilitating the acceptance of the EPSS: (a) training and support, (b) environmental, (c) organizational, and (d) other. First of all, the police officers highlighted training and end-user support as a facilitating condition for the acceptance of the EPSS. They underlined the importance of training to attaining a certain level of proficiency required for effective utilization of the EPSS. Training is regarded as one of the most important interventions which enhance adoption of performance support systems (Gery, 1991; McKay & Wager, 2007; Nguyen & Woll, 2006). Similarly, Maughan (2005) argues that "EPSS users must undergo training to be able to access the system at a level of proficiency necessary to acquire support for the tasks they perform" (p. 54). However, how and when training should be given seems to be an important issue for the effect of training on the acceptance of the EPSS.

In addition, the police officers emphasized a need for end-user support for effective utilization of the EPSS. End-user support can help the police officers to overcome

problems that emerged during usage. This support is likely to enhance user adoption of the EPSS because it enables users to find answers to questions about system usage and solve emergent problems during usage. Moore and Orey (2000) also suggest that an availability of active and constant support make users motivated to use performance support tools. Many past studies have shown that end-user support has an impact on users' beliefs and acceptance of an information technology (Bhattacherjee & Hikmet, 2008; Igbaria et al., 1995; Kim, Kim, Aiken, & Soon, 2006).

Secondly, the influence of peers, early adopters, and superiors were found as environmental conditions that encourage the police officers to adopt the EPSS. In the current research, support from the co-workers was considered an important source that would help the police officers use the EPSS effectively. In general, peer support is regarded as one of the strongest interventions leading to greater acceptance of a system because it may help users to (a) understand a system, (b) modify or enhance a system or work process, and (c) form favorable perceptions related to using a system (Venkatesh & Bala, 2008). In addition, the police officers underlined the influence of early adopters in the Crime Scene Investigation and Identification Units on others' decision to use the EPSS. Early adopters play an important role in others' adoption decisions regarding system use because they serve as a model for others (Rogers, 2003). Accordingly, Dormant (1999) also points out the influence of these key people on the implementation of human performance technologies in organizations. Furthermore, in the present study, the police officers also placed an emphasis on the role of the superiors in enhancing acceptance of the EPSS. Similarly, Moore and Orey (2000) identify leadership as an important factor to encourage users to employ the performance support tools. In addition, Habelow (2000) found that management encouragement was one of the significant predictors that explain EPSS usage.

Thirdly, the information technology infrastructure, updates, and personnel management were organizational conditions that foster the police officers' acceptance of the EPSS. For effective utilization of the EPSS, police officers emphasized that there should be a sufficient number of computers with adequate hardware in the bureaus of the Crime Scene Investigation and Identification Units.

One of the basic prerequisites for the successful adoption of an EPSS is having a sufficient information technology infrastructure because it may influence the extent to which users can benefit from the system. For example, low network capacity may cause users to confront a barrier in access to the data and information base in an effective way. Therefore, an absence of adequate information technology infrastructure may hinder the successful utilization of an EPSS in an organization (Rossett, 1996). Maughan (2005) also stresses the importance of communication and computer infrastructure in successful EPSS implementation. Regarding the acceptance of the EPSS, moreover, the police officers highlighted the important role of the updates that respond to their problems and needs. Updates in the EPSS may lead to greater user acceptance because they could make the system more functional and usable for the users. Lastly, due to an unqualified or insufficient number of personnel in the bureaus or crime scene investigation teams, the police officers may not realize the potential of the system. Therefore, they placed a considerable emphasis on the planning, organizing, and development of personnels for the effective utilization of the EPSS.

Finally, experience with the system and benefits of the system appeared as other conditions that facilitate the acceptance of the EPSS. The police officers emphasized the importance of gaining experience with the system in the acceptance of the EPSS. Ajzen and Fishbein (1980) says that "direct experience may help preserve a stable intention and hence a strong intention-behavior relation" (p. 50). Consistent with expectation, Taylor and Todd (1995b) found a stronger relationship between intention and system usage for the experienced users. Experience with the EPSS may make the users more clear and certain about how it works in their own conditions. Moreover, the police officers considered benefits of the EPSS as an important incentive for acceptance of the system. Like many innovations, perceived benefit (or relative advantage) is one of the key attributes that influence the adoption of an information system (Rogers, 2003). Similarly, how the users benefit from the EPSS is likely to influence their adoption decisions.

5.3. Implications and Suggestions for the Researchers and Practitioners

This study has a number of important implications for researchers and practitioners in the field of instructional design and technology. The findings of this study suggest that TAM is a valid model to predict users' intentions to use an EPSS. The relationships observed in the present study provided enough evidence for validity of TAM to explain acceptance of the EPSS. Consistent with TAM (Davis et al., 1989), perceived usefulness, perceived ease of use, and attitude toward using the EPSS were found to be significant factors contributing to the police officers' intentions to use the EPSS. This finding corroborates Barker's (2010b) suggestion on use of TAM to study acceptance of an EPSS.

Similar to the major studies on TAM (Davis, 1989; Davis et al., 1989), the significance of perceived usefulness over perceived ease of use has an important practical implication for EPSS designers. For successful acceptance of an EPSS, designers primarily should give importance to the functions of an EPSS offered to support job performance. Therefore, it is important to determine the exact performance problems or needs and select the most effective performance systems to address them. This finding does not mean that ease of use does not play an important role in the acceptance of an EPSS. However, designers should not ignore the usefulness of an EPSS for the sake of ease of use. People tend to overcome difficulties in using a system if it has a critically needed functionality (Davis, 1989).

The ease of use of the EPSS made contributions to the police offices beliefs regarding the usefulness of the system. This finding suggests that techniques used to promote the ease of use of an EPSS (e.g., interface design, navigational design, usability testing) influence the extent to which the system enhances users' job performance. Therefore, designers should create an effective user interface for not only the ease of use but also the usefulness of an EPSS.

As in the original formulation of TAM, this study confirms the relationship between the attitude toward using the EPSS and the intention to use it. However, Davis et al. (1989) suggested that perceived usefulness and perceived ease of use have a strong influence on the behavioral intention to use a system without having a particular attitude toward it. Therefore, in many subsequent studies, attitude was eliminated

from the TAM (e.g. Venkatesh & Davis, 1996; Venkatesh & Davis, 2000). Moreover, the type of use setting, mandatory or voluntary, influences role of attitude on behavioral intention to use a system (Yousafzai et al., 2007a). Therefore, a further investigation may be needed to examine the effect of users' attitudes toward using an EPSS on their usage intentions in different use settings.

This study includes both quantitative and qualitative findings about the usefulness of the EPSS for the police officers in the Crime Scene Investigation and Identification Units. In this respect, it helps practitioners explain to users how useful EPSSs can be for organizations. In addition, it guides researchers in studies which focus on usefulness of an EPSS in a organization.

Based on qualitative analysis of the interviews, this study provides a much better understanding of the factors that users may consider when evaluating the usefulness and ease of use of the EPSS. This guiding framework may make a valuable contribution into the design and implementation plan of an EPSS in order to enhance the level of user acceptance. In the light of these factors, specific interventions could be designed and implemented in order to minimize resistance of users, help them develop an accurate perceptions related to usefulness and ease of use of the EPSS, and encourage adoption.

From the perspective of the diffusion of innovation theory (Rogers, 2003), this study implies that an understanding of the factors influencing usefulness and ease of use allows designers to increase the adoption rate of an EPSS. The interventions addressing these factors positively influence users' perceptions regarding specific attributes of an EPSS and increase its adoption rate. As a result, the slope in S-shaped adoption curve of the EPSS rose rapidly.

From a practical standpoint, this study also may suggest several recommendations to enhance acceptance of an EPSS. They are related, but not limited to, the following points.

- Users should have adequate computer knowledge and skills which are necessary to use an EPSS effectively. Based on the analysis of users, well-

designed training programs probably help users to acquire adequate basic computer knowledge and skills to be able to use an EPSS.

- Users should enjoy the functions and features of an EPSS. Training interventions lead to an increase in the level of intrinsic motivation that users have in the use of an information system (Venkatesh et al, 2002). In addition to training, system-related characteristics, user participation, and incentive alignment can potentially enhance a favorable perception of enjoyment (Venaktesh & Bala, 2008).
- Users should have enough hands-on experience with an EPSS before actual usage. Trialability and user involvement through hands-on activity can allow users to obtain experience with an EPSS, which leads to a better understanding of features and functionalities of the system.
- Users should not have any apprehension when performing their tasks with an EPSS. If users have a high level of anxiety toward EPSS use, it is crucial to decrease it for successful EPSS acceptance. User participation, training, and organizational support can potentially help reducing anxiety related to system use (Venaktesh & Bala, 2008). In addition, experience with the system is negatively related to anxiety (Chua, Chen, & Wong, 1999). With use experience, people are likely to gain more confidence in using an EPSS.
- Users should be encouraged to use an EPSS rather than being forced to use it. User involvement in the design and development process and organizational support are likely to make a contribution to users' voluntariness to use the performance support systems.
- The data entry process in an EPSS should be as simple as possible. There are many ways to make the data entry process in an EPSS simpler, such as via the data entry screen design, input masks, and data validation rules (Shelly & Rosenblatt, 2012).
- An EPSS should include performance supports which are designed to address performance problems and opportunities in organizations effectively. Using performance-centered design principles, designers could develop the performance support systems that improve work performance. Gery (1995) provides a list of attributes of effective performance support systems in terms of work context, user interface, interactivity, automation, knowledge access

and use, and consistency. When an EPSS embodies these attributes more, the system is more likely to have an impact on individual or organizational performance.

- Performance support systems should be relevant to the tasks which users need assistance performing on the job. Venkatesh and Bala (2008) suggest that design characteristics, management support, incentive alignment, training, organizational support, and peer support are interventions that influence employees' perceptions regarding job relevance of a system.
- An EPSS should be easy to understand. Training interventions, experience with the system, and user participation may help users to handle any complexity in the system.
- An EPSS should be updated regularly to fix problems or bugs, improve existing tools and resources, or add new functions and functionalities to the system. The contents of an EPSS should stay up to date with current developments in the procedures and practices related to job-related tasks. Otherwise, it becomes obsolete in supporting the expected tasks. In addition, when any problems or bugs in the functions of an EPSS are detected, they should be fixed immediately for the effective utilization of the EPSS in an organization.
- The devices which provide access to an EPSS should be used in an effective, efficient, and satisfactory manner. According to the International Organization for Standardization, usability depends on measures of effectiveness, efficiency, and satisfaction with which specific users performs specific tasks in specific environments (ISO 9241-11). Therefore, designers should choose the devices which provide an accurate and complete way for users to achieve their goals; require low effort, time, and financial cost to use; and do not cause users to have any discomfort or negative attitude about it. For example, there are various mobile devices with different technical capabilities which can be used to access the performance support systems. Usability test helps to determine the appropriateness of devices for an EPSS in a specified context of use.
- An EPSS should be user-friendly in terms of navigation, interface design, and basic operations. The user friendliness of an information system is

attributed to five characteristics: learnability, efficiency, memorability, errors, and satisfaction (Nielsen, 1993). Therefore, the design process should aim to develop performance support systems that are easy to learn, efficient to use, easy to remember, error free, and subjectively satisfying. Measurement of these attributes shows the extent of the user friendliness of an EPSS in a specified context of use.

- The user interfaces of an EPSS should be designed to make use of screen and system functions easily and effectively for users. There are general characteristics of the interface that improve ease of use and impact of an information system on an organization (Galitz, 2007; Shneiderman, 2005). Moreover, performance-centered design, first outlined by Gery (1995) and subsequently revised by Marion (2002), articulates that the user interface of performance support systems should have embedded knowledge; make use of prior learning and physical reality; be compatible with natural work situations; deliver information in an appropriate way; provide helpful visualizations of information; and provide options for the application interface and resources. In addition, the user interface should be consistent with the natural workflow and logic of the job (Villachica et al, 2006). Before EPSS implementation, usability testing on the user interface is critical for successful utilization of an EPSS.
- Organizations should have information technology infrastructures which meet minimum requirements of an EPSS in terms of hardware components, software, and network. Although EPSSs are cost-effective solutions, they require an advanced combination of hardware tools, information databases, and appropriate computer technologies (Bayram, 2005). Software and hardware expenses are one of the critical factors that influence the success of performance support systems (Nguyen, 2010, 2012). Chang (2007) also found cost as an important barrier for effective EPSS utilization. Therefore, it is important for organizations to plan their budgets and resources for hardware, software, and network expenses.
- Organizations should plan, organize, and develop employees in accordance with work procedures and tasks that an EPSS introduces.

- Organizations should plan training programs and end-user support facilities (e.g., help systems, technical support) to facilitate the utilization of an EPSS without any problem.

In the present study, the results showed that what the police officers thought to be facilitating conditions for effective utilization of the EPSS were mostly similar to the factors that they considered for usefulness and ease of use. This illustrates mediating roles of perceived usefulness and perceived ease of use in effect of external variables on usage intention (Davis et al., 1989). Therefore, when interventions are planned to facilitate the acceptance of an EPSS, researchers should be aware of their effect on the usefulness and ease of use of the EPSS. This will help researchers formulate better strategies to facilitate the acceptance of an EPSS.

5.4. Implications for Future Studies

This study points out a number of research avenues for future studies. Firstly, although this study helps explain and understand the acceptance of the EPSS, the discussed findings are based on a particular system and a specific user group in terms of professional and geographical aspects. In order to enhance generalizability of the quantitative results, this study provided demographics of the participants in a detailed way. In addition, thick descriptions and purposeful sampling were improved the transferability of the qualitative findings to other similar contexts. However, some caution needs to be taken when extrapolating and generalizing the findings to different performance support systems, groups, and contexts. Therefore, future research may be needed to validate the quantitative and qualitative findings beyond the specific conditions in the study.

Secondly, this study focused on only the police officers' initial decision to use the EPSS. It was intended to explain and understand the acceptance of the EPSS based on TAM. Although the findings may provide insight into the successful acceptance of the EPSS, they may have limited implications for understanding issues regarding actual use of the EPSS in practical settings. In other words, acceptance of the EPSS by the police officers may not guarantee successful future use of the EPSS in the Crime Scene Investigation and Identification Units. Therefore, a future study may help to explain and understand the continued usage of EPSSs based on TAM. Similar

to previous TAM studies, a longitudinal study may provide empirical data that predicts the acceptance of an EPSS at different points in time.

Thirdly, although the qualitative findings revealed the factors that the police officers consider when judging the usefulness and ease of use of the EPSS, this study did not test their contributions to perceived usefulness and perceived ease of use. Therefore, future quantitative research may be useful to investigate how well the factors predict perceived usefulness and perceived ease of use. This future study also might examine the mediating role of perceived usefulness and perceived ease of use between external factors and behavioral intention to use.

Fourthly, this study demonstrates that attitude significantly influences the police officers' behavioral intention to use the EPSS. However, as discussed before, the importance of attitude in TAM can change due to the influence of beliefs on intention and type of use setting. Therefore, there is a need for a future study to investigate the role of attitude in the acceptance of EPSSs.

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APPENDIX A

APPROVAL FORM (TURKISH)

T.C.
İÇİŞLERİ BAKANLIĞI
Emniyet Genel Müdürlüğü

Sayı : B.05.1.EGM.0.34.10.01.
Konu : Performans Yönetimi.

GENEL MÜDÜRLÜK MAKAMINA

İlgi : 12.06.2009 tarih ve B.30.2.ODT.0.12.00.00/211/09-72 sayılı yazı.

İlgi sayılı yazı ile, müşteri kurum olarak Daire Başkanlığımız ile proje yürütücüleri olan ODTÜ Eğitim Fakültesi PDI-Erkom A.Ş. tarafından TÜBİTAK 1007 KAMAG programı kapsamında yürütülen 107G037 proje nolu "Kriminal Laboratuvar Hizmetleri için Elektronik Performans Yönetimi Destekli Öğrenen Organizasyon Yapılandırılması" isimli proje çalışmalarının 15/06/2008 tarihinde başladığı bildirilmiştir.

Projenin "Analiz, Tasarım, Geliştirme, Uygulama ve Değerlendirme" aşamalarında elde edilecek verilerin ilgili proje işbirliği protokolü çerçevesinde, ODTÜ proje ekibinde aktif olarak yer alan Arş. Gör. Evren ŞUMUER ile Arş. Gör. İlker YAKIN'ın doktora tez çalışmalarında sadece bilimsel amaçlı olarak kullanılabilmesi dairemiz tarafınca uygunsa da,

Takdir ve tensiplerinize arz ederim.

Seyit DEMİRCİ
Kriminal Polis Laboratuvarları Dairesi Başkanı
1.Sınıf Emniyet Müdürü

OLUR
26./06/2009

Mehmet TOKGÖZ
Emniyet Genel Müdür a.
Emniyet Genel Müdür Yardımcısı
1. Sınıf Emniyet Müdürü

Gölbaşı / ANKARA
Telefon : 0 312 412 45 78
Faks: 0 312 499 70 97
Ayrıntılı bilgi için: S.KISAOĞLU

APPENDIX B

MIDDLE EAST TECHNICAL UNIVERSITY HUMAN SUBJECTS ETHICS COMMITTEE APPROVAL FORM (TURKISH)

UYGULAMALI ETİK ARAŞTIRMA MERKEZİ
APPLIED ETHICS RESEARCH CENTER

ORTA DOĞU TEKNİK ÜNİVERSİTESİ
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Sayı: B.30.2.ODT.0.AH.00.00/126/114 -1153

12 Eylül 2012

Gönderilen: Prof. Dr. Soner Yıldırım
Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü

Gönderen : Prof. Dr. Canan Özgen
IAK Başkan Yardımcısı

İlgi : Etik Onayı

" Elektronik Performans Destek Sistemlerinin Kabulünü Anlamaya Doğru: Kullanıcıların Kullanışlılık ve Kullanım Kolaylığına İlişkin Algılarını Ne Belirler? " isimli araştırmanız "İnsan Araştırmaları Komitesi" tarafından uygun görülerek gerekli onay verilmiştir.

Bilgilerinize saygılarımla sunarım.

Etik Komite Onayı

Uygundur

12/09/2012

Prof.Dr. Canan ÖZGEN
Uygulamalı Etik Araştırma Merkezi
(UEAM) Başkanı
ODTÜ 06531 ANKARA

APPENDIX C

FINAL STATE OF THE QUESTIONNAIRE (TURKISH)

Değerli Katılımcı,

Bu çalışma Emniyet Genel Müdürlüğü Kriminal Polis Laboratuarları Daire Başkanlığı liderliğinde TUBİTAK Kamu Kurumları Araştırma ve Geliştirme Projeleri Destekleme Programı çerçevesinde yürütülen **"Kriminal Laboratuar Hizmetleri için Elektronik Performans Yönetimi Destekli Öğrenen Organizasyon Yapılandırılması"** projesi kapsamında Araş. Gör. Evren Şumuer tarafından Doç. Dr. Soner Yıldırım danışmanlığında yürütülmektedir. Çalışmanın amacı, Olay Yeri İnceleme ve Kimlik Tespit Hizmetlerine yönelik olarak geliştirilen Elektronik Performans Destek Sisteminin kabulünü etkileyen etkenlerin belirlenmesidir.

Bu çalışmada yer alan anketi doldurmanız yaklaşık 20 dakika sürmektedir. Çalışmaya katılım tamamen gönüllük esasına dayanmaktadır. Çalışmada kullanılan anket maddeleri kişisel rahatsızlık verecek öğeler içermemektedir. Bununla birlikte, uygulama esnasında katılımınızın yaratabileceği herhangi bir rahatsızlık hissettiğiniz taktirde, istediğiniz aşamada, istediğiniz zaman uygulamayı bırakıp çıkma hakkına sahipsiniz.

Hiçbir sorunun ya da ölçek maddesinin doğru ya da yanlış bir cevabı yoktur. Önemli olan sizin ne düşündüğünüz ve hissettiğinizdir. Bu nedenle, vereceğiniz samimi yanıtların araştırma sonuçlarının güvenilirliği açısından çok önemli olduğunu unutmayınız. Anketlerden elde edilecek kişisel bilgiler sadece bilimsel amaçlar için kullanılacak ve kesinlikle gizli tutulacaktır.

Çalışmaya yapacağınız değerli katkılar için şimdiden teşekkür ederiz. Çalışma hakkında daha fazla bilgi sahibi olmak isterseniz aşağıdaki iletişim bilgilerden bizimle irtibata geçebilirsiniz.

Saygılarımızla…

Doç.Dr. Soner Yıldırım
Orta Doğu Teknik Üniversitesi
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Araş.Gör. Evren Şumuer
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Bu çalışmaya tamamen gönüllü olarak katılıyorum ve verdiğim bilgilerin bilimsel amaçlı olarak kullanılmasını kabul ediyorum.

Ad Soyadı:

Tarih:

İmza:

Emniyet Genel Müdürlüğü
Kriminal Polis Laboratuvarları Dairesi Başkanlığı
OYİ-KT Elektronik Performans Destek Sisteminin Kullanımı*

No. .....

Değerli Katılımcı,

Biraz sonra dolduracağınız anket Olay Yeri İnceleme ve Kimlik Tespit Şube Müdürlüğü hizmetlerine yönelik olarak geliştirilen Elektronik Performans Destek Sisteminin kullanımına etki eden unsurların neler olduğunu belirlemeyi amaçlamaktadır. Elde edilen sonuçlar, Olay Yeri İnceleme ve Kimlik Tespit Şube Müdürlüğü personelinin bu sistemi kullanmasına etki eden faktörlerin belirlenmesine temel oluşturacaktır.

Çalışmada kullanılan ölçek maddeleri kişisel rahatsızlık verecek bir öğe içermemektedir. Hiçbir sorunun ya da ölçek maddesinin doğru ya da yanlış cevabı yoktur. Önemli olan sizin ne düşündüğünüz ve hissettiğinizdir. Bu nedenle, soruları ya da ölçek maddelerini yanıtlarken göstereceğiniz dikkat ve samimiyet, sonuçların güvenilirliği açısından çok önemli olduğunu unutmayınız. **Elde edilecek bilgiler ve yanıtlar sadece bilimsel amaçlar için kullanılacak ve kesinlikle gizli tutulacaktır.** Anket 3 bölümden oluşmakta ve tamamlamanız yaklaşık 20 dakika sürecektir.

Çalışmaya yapacağınız değerli katkılar için şimdiden teşekkür ederiz.

Araştırma Grubu

BÖLÜM I

Bu bölüm, işinizde Elektronik Performans Destek Sisteminin kullanımına yönelik ifadelerden oluşmaktadır. Anket maddelerindeki "sistem" sözcüğü işinizde kullanacağınız Elektronik Performans Destek Sistemine karşılık gelmektedir. Lütfen okuduğunuz anket maddelerini **işinizde Elektronik Performans Destek Sisteminin kullanımını düşünerek yanıtlayınız.** Anket maddesini okuduktan sonra, verilen ölçeği göz önünde bulundurarak 1 ile 7 arasında sizi en iyi tanımlayan değeri işaretleyiniz. Soruların bazıları benzer gelebilir fakat bu sorular farklı konulara yöneliktir.

	Kesinlikle Katılmıyorum	Çoğunlukla Katılmıyorum	Kısmen Katılmıyorum	Ne Katılmıyorum Ne de Katılıyorum	Kısmen Katılıyorum	Çoğunlukla Katılıyorum	Kesinlikle Katılıyorum
1. İşimde sistemi kullanma imkanım varsa, onu kullanmaya bakarım.	①	②	③	④	⑤	⑥	⑦
2. İşimde sistemi kullanma imkanım olduğunda, tahminimce onu kullanırım.	①	②	③	④	⑤	⑥	⑦
3. İşimde sistemi kullanma imkanım olduğunda, onu kullanmayı planlarım.	①	②	③	④	⑤	⑥	⑦
4. İşimde sistemi kullanmak işlerimi daha çabuk şekilde yapmamı sağlar.	①	②	③	④	⑤	⑥	⑦
5. Sistemi kullanmak iş performansımı geliştirir.	①	②	③	④	⑤	⑥	⑦
6. İşimde sistemi kullanmak verimliliğimi arttırır.	①	②	③	④	⑤	⑥	⑦
7. Sistemi kullanmak işlerimi daha kolaylaştırır.	①	②	③	④	⑤	⑥	⑦
8. İşimde sistemi kullanmayı yararlı bulurum.	①	②	③	④	⑤	⑥	⑦
9. Sistemin nasıl kullanıldığını öğrenmek benim için kolaydır.	①	②	③	④	⑤	⑥	⑦
10. İstediklerimi sistemi kullanarak yapmayı kolay bulurum.	①	②	③	④	⑤	⑥	⑦
11. Sistemi kullanabilecek beceriye sahip olmak benim için kolaydır.	①	②	③	④	⑤	⑥	⑦
12. Sistemi kullanmayı kolay bulurum.	①	②	③	④	⑤	⑥	⑦

BÖLÜM II

Bu bölüm işinizde Elektronik Performans Destek Sistemi kullanımına karşı tutumunuza yönelik ifadelerden oluşmaktadır. Anket maddelerindeki "sistem" sözcüğü işinizde kullanacağınız veya kullandığınız Elektronik Performans Destek Sistemine karşılık gelmektedir. Lütfen okuduğunuz anket maddelerini **işinizde Elektronik Performans Destek Sisteminin kullanımını düşünerek yanıtlayınız.** Anket maddesini okuduktan sonra, verilen ölçeği göz önünde bulundurarak **1 ile 7 arasında sizi en iyi tanımlayan değeri İŞARETLEYİNİZ.**

1.	İşimde bu sistemi kullanma ... bir fikirdir.	**kötü**	①	②	③	④	⑤	⑥	⑦	**iyi**
2.	İşimde bu sistemi kullanma ... bir fikirdir.	**mantıksız**	①	②	③	④	⑤	⑥	⑦	**mantıklı**
3.	İşimde bu sistemi kullanma fikrinden	**hoşlanmam**	①	②	③	④	⑤	⑥	⑦	**hoşlanırım**
4.	İşimde bu sistemi kullanmak	**zevksizdir**	①	②	③	④	⑤	⑥	⑦	**zevklidir**

* Bu araştırma, Emniyet Genel Müdürlüğü, Kriminal Polis Laboratuarları Dairesi Başkanlığı liderliğinde TUBİTAK Kamu Kurumları Araştırma ve Geliştirme Projeleri Destekleme Programı kapsamında "Kriminal Laboratuar Hizmetleri için Elektronik Performans Yönetimi Destekli Öğrenen Organizasyon Yapılandırması" projesi kapsamında gerçekleştirilmektedir.

Lütfen arka sayfaya geçiniz.

BÖLÜM III

Bu bölümde sizden kişisel ve Elektronik Performans Destek Sisteminin kullanımına yönelik bazı bilgiler istenmektedir. Sorulardaki kutulardan size uygun olanına **"X"** işareti koyunuz. Lütfen sizden istenen bilgileri eksiksiz ve doğru bir şekilde doldurunuz. **Elde edilecek bilgiler ve yanıtlar sadece bilimsel amaçlı kullanılacak ve kesinlikle gizli tutulacaktır.**

1. Cinsiyetiniz:

   ☐ Kadın

   ☐ Erkek

2. Yaşınız:

   ..... *(lütfen yazınız.)*

3. Eğitim Durumunuz:

   ☐ Lise
   ☐ Ön Lisans – Yüksekokul
   ☐ Lisans – 4 Yıllık Üniversite
   ☐ Yüksek Lisans
   ☐ Doktora

4. Olay Yeri İnceleme ve Kimlik Tespit Şube Müdürlüğünde göreve başlama yılınız nedir? Lütfen yazınız.

   .....

5. İşinizi yaparken Elektronik Performans Destek Sistemini ne kadar sıklıkla kullanacağınızı düşünüyorsunuz?

   [1] Son Derece Az
   [2] Oldukça Az
   [3] Az
   [4] Ne Az Ne de Fazla
   [5] Fazla
   [6] Oldukça Fazla
   [7] Son Derece Fazla

Elektronik Performans Destek Sisteminin kullanımına yönelik olarak belirtmek istediğiniz diğer görüşleriniz için aşağıdaki bölümü kullanabilirsiniz.

.....
.....
.....

■ ***Çalışmaya yaptığınız değerli katkılar için teşekkür ederiz...***

APPENDIX D

INTERVIEW GUIDE (TURKISH)

Değerli Katılımcı,

Bu çalışma Emniyet Genel Müdürlüğü Kriminal Polis Laboratuarları Daire Başkanlığı liderliğinde TUBİTAK Kamu Kurumları Araştırma ve Geliştirme Projeleri Destekleme Programı çerçevesinde yürütülen **"Kriminal Laboratuar Hizmetleri için Elektronik Performans Yönetimi Destekli Öğrenen Organizasyon Yapılandırılması"** projesi kapsamında Araş. Gör. Evren Şumuer tarafından Doç. Dr. Soner Yıldırım danışmanlığında yürütülmektedir. Görüşmenin amacı, Olay Yeri İnceleme ve Kimlik Tespit Hizmetlerine yönelik olarak geliştirilen Elektronik Performans Destek Sisteminin kullanışlılığı ve kullanım kolaylığı ile ilgili olarak kullanıcılarda algıların nasıl oluştuğunu ve sistemin kabulünü kolaylaştırabilecek durumların neler olabileceğini incelemektir.

Görüşmenin yaklaşık olarak 45 dakika süreceği tahmin edilmektedir. Görüşmeye katılım tamamen gönüllük esasına dayanmaktadır. Görüşme sırasında sorulan sorular kişisel rahatsızlık verecek öğeler içermemektedir. Bununla birlikte, uygulama esnasında katılımınızın yaratabileceği herhangi bir rahatsızlık hissettiğiniz taktirde, istediğiniz aşamada, istediğiniz zaman görüşmeyi bırakıp çıkma hakkına sahipsiniz.

Görüşmelerde önemli olan sizin ne düşündüğünüz ve hissettiğinizdir. Bu nedenle, vereceğiniz samimi yanıtların sonuçlarının güvenilirliği açısından çok önemli olduğunu unutmayınız. Bu görüşmede söyleyeceklerinizin tümü gizli tutulacaktır. Raporlarda, elde edilen sonuçlar kesinlikle görüşülen kişilerin bilgileri belirtilmeden yazılacaktır.

İzin verdiğiniz taktide, görüşme ses kayıt cihazı kullanılarak kaydedilecektir.

Çalışmaya yapacağınız değerli katkılar için şimdiden teşekkür ederiz. Çalışma hakkında daha fazla bilgi sahibi olmak isterseniz aşağıdaki iletişim bilgilerinden bizimle irtibata geçebilirsiniz.

Saygılarımızla…

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Bu çalışmaya tamamen gönüllü olarak katılıyorum ve verdiğim bilgilerin bilimsel amaçlı olarak kullanılmasını kabul ediyorum.

Ad Soyadı:

Tarih:

İmza:

GÖRÜŞME FORMU

Görüşmenin Yapıldığı Yer:

Başlangıç Tarihi ve Saati:

Bitiş Tarihi ve Saati:

Görüşmeci:

GİRİŞ

Merhaba, ben <<< *Araştırmacının Adı ve Soyadı*>>>. Bu projede araştırmacı olarak görev yapmaktayım. Orta Doğu Teknik Üniversitesi olarak kurumunuzda kullanılmaya başlanan Elektronik Performans Destek Sisteminin kullanışlılığı ve kullanım kolaylığına yönelik bir çalışma yürütmekteyiz. Bu nedenle sizinle müdürlüğünüzde de kullanılmaya başlanan bu sistem ile ilgili konuşmak istiyoruz. Bu görüşmenin amacı, Elektronik Performans Destek Sisteminin kullanışlılığı ve kullanım kolaylığı ile ilgili olarak kullanıcılarda algıların nasıl oluştuğunu çeşitli açılardan incelemektir. Bu bakımdan sistemin gerçek sahibi olan kullanıcıların bu konudaki deneyimlerini ve düşüncelerini bizlerle paylaşmasının oldukça önemli olduğunu düşünüyoruz. Bu görüşmelerden ortaya çıkacak sonuçların, diğer illerde uygulamaya konulacak bu sistemin veya farklı organizasyonlardaki benzer sistemlerin kullanışlılığının ve kullanım kolaylığının arttırılmasına katkı sağlayacağını düşünüyoruz.

- Bu görüşmede söyleyeceklerinizin tümü gizli tutulacaktır. Bu bilgilerin Orta Doğu Teknik Üniversitesindeki araştırmacılar dışında birilerin görmesine izin verilmeyecektir. Raporlarda, elde edilen sonuçlar kesinlikle görüşülen kişilerin bilgileri belirtilmeden yazılacaktır.
- Görüşmeyi izin verirseniz kaydetmek istiyorum. Bu durumun sizin için bir sakıncası var mı?
- Bu görüşmenin yaklaşık bir saat kadar süreceğini tahmin ediyorum. Eğer kendinizi hazır hissediyorsanız ilk soru ile başlamak istiyorum.

GÖRÜŞME SORULARI

1. Elektronik Performans Destek Sisteminin işinizde kullanımına ilişkin neler düşünüyorsunuz?
2. İşinizde bu sisteminin kullanımı size ne gibi yaralar sağlamaktadır?
3. İşiniz için bu sistemin faydalı olduğu/olmadığı yönünde bir tespitte bulunurken neleri göz önünde bulundurursunuz?
    - Kişisel özellikler
    - Sisteme ilişkin özellikler
    - Kurumsal özellikler
4. Bu sistemi kullanımının kolaylığı bakımından nasıl değerlendirirsiniz?
5. Bu sistemin kullanımının kolay olduğuna / olmadığına karar verirken neleri dikkate alırsınız?
    - Kişisel özellikler
    - Sisteme ilişkin özellikler
    - Kurumsal özellikler
6. Bu sistemin kurum içinde kullanımını kolaylaştırmada nelerin etkisi olur?
7. Görüşmemizdeki sorularım bitti, gerçekten çok yararlı bir görüşme oldu. Son olarak Destek Sisteminin kullanımı ile ilgili olarak sizin eklemek istediğiniz başka bir husus var mı?

VITA

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EDUCATION

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High School	Manisa High School	1997

WORK EXPERIENCE

Year	Place	Enrollment
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FOREIGN LANGUAGE

English

PUBLICATIONS

1. Şumuer, E., Yakın, İ., & Yıldırım, S. (2010). Bilişim teknolojileri öğretmen adaylarının demografik özellikleri, öğretmenlik mesleğine ilişkin tutumları ve eğitime ilişkin görüsleri. *Eğitim Bilimleri ve Uygulama. 9* (18), 21-46.

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HOBBIES

Computer Technologies, Snowboarding