THE DESIGN, DEVELOPMENT AND EVALUATION OF AN ELECTRONIC PERFORMANCE SUPPORT SYSTEM (EPSS) FOR THE CRIME SCENE INVESTIGATION UNIT

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ABSTRACT

THE DESIGN, DEVELOPMENT AND EVALUATION OF AN ELECTRONIC PERFORMANCE SUPPORT SYSTEM (EPSS) FOR THE CRIME SCENE INVESTIGATION UNIT

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The purpose of this study is to design, develop and evaluate an electronic performance support system (EPSS) for the crime scene investigation unit (CSI). For this purpose, a sequential explanatory strategy as a procedure of the mixed method design was used in analysis and evaluation of the EPSS. The research was composed of three main phases: analysis; design, development and implementation, and evaluation of the EPSS. In first phase composed of performance and cause analyses, the CSI Unit's existing information, and contributing causal performance factors based on Gilbert' Behavior Engineering Model were explored. In performance analysis phase, official documentation of the CSI Unit was reviewed. As for cause analysis, the survey and focus group interviews were conducted to 1176 and 22 CSI officers, respectively. These data were analyzed using with both quantitative and qualitative methods to facilitate the selection of the most appropriate intervention and its components. Analyses results revealed that 14 basic influences grouped under the workplace and competency on human behavior impacted performance of the officers. Based on these results, an EPSS composed of intrinsic, extrinsic and external levels, and support components was designed and developed in the second phase. Having been implemented, the evaluation of the EPSS based on the Kirkpatrick' Four Levels of Evaluation Model was conducted to determine the overall impact, perceived benefits, and effectiveness of the intervention in third phase. In this phase, a survey, interviews, computer logs and a checklist were used so as to assess the accomplishment of the EPSS. While the survey and the checklist were administered to the 191 officers and 2 experts from the field, the interviews were conducted with 12 officers. Evaluation results admitted that the CSI officers' reactions were very positive to the EPSS. While, an intrinsic support made a major contribution to their productivity, establishing standardization would be perceived as the major impact of the EPSS. Lastly, increasing identity and simplifying criminal justice system were the two main impact factors on the society that the system would influence positively.

Keywords: Human Performance Technology, Electronic Performance Support System, Cause Analysis, Behavior Engineering Model, Evaluation, Kirkpatrick's Four Levels of Evaluation Model

ÖZ

OLAY YERİ İNCELEME BİRİMİ İÇİN ELEKTRONİK PERFORMANS DESTEK SİSTEMİNİN TASARIMI, GELİŞTİRİLMESİ VE DEĞERLENDİRİLMESİ

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Bu çalışmanın amacı, Olay Yeri İnceleme (OYI) Birimi için bir elektronik performans destek sistemi (EPDS) tasarlamak, geliştirmek ve değerlendirmektir. Bu amaçla, karma yöntemin bir süreci olan ardışık açıklayıcı stratejisi EPDS'nin analiz ve değerlendirilmesinde kullanılmıştır. Araştırma üç aşamdan oluşmaktadır: analiz; tasarım, geliştirme ve uygulama ve değerlendirme. Performans ve neden analizinden oluşan ilk aşamada OYI Birimi'nin varolan bilgi ve Gilbert'in Davranış Mühendisliği Modeli'ne dayanarak nedensel temel performans etkenleri ortaya çıkarılmıştır. Performans analizinde, OYI Birimi'ndeki resmi dokümantasyon incelenmiştir. Neden analizi ölçek doldurma ve odak grup görüşmeleriyle sırasıyla 1176 ve 22 OYI memurlarıyla gerçekleştirilmiştir. Bu veriler en uygun çözüm ve bileşenlerinin seçilmesini kolaylaştırmak için hem nicel hem de nitel olarak analiz edilmiştir. Analiz sonuçları birey davranışları üzerinde memurların performanslarını etkileyen iş yeri ve yeterlilik ana başlıkları altında gruplanan 14 temel etkileri ortaya çıkarmıştır. İkinci aşamada, bu sonuçlara dayanarak, yapısal, dışsal ve harici destek düzeyleri ve destek bileşenlerinden oluşan EPDS tasarlanmış ve geliştirilmiştir. Uygulama sonrasında, üçüncü aşamada, çözümün ayrıntılı etkisini, algılanan faydaları ve etkililiğini belirlemek amacıyla Kirkpatrick'in Dört Düzeyli Değerlendirme Modeli kullanarak EPDS'nin değerlendirmesi gerçekleştirilmiştir. Bu aşamada EPDS'nin başarısını değerlendirmek için ölçek, görüşmeler, bilgisayar kayıtları ve kontrol listesi kullanılmıştır. Ölçek ve kontrol listesi sırasıyla 191 OYI memuruna ve alandaki 2 uzmana uygulanmış, görüşmeler ise 12 OYI memuru ile gerçekleştirilmiştir. Değerlendirme sonuçları OYI memurlarının EPDS'ye karşı tepkilerinin oldukça olumlu olduğunu göstermektedir. Üretkenliklerine başlıca katkıyı yapısal destek sağlarken, standardı getirmesi EPDS'nin asıl etkisi olarak algılanmaktadır. Son olarak, kurum kimliğinin iyileştirilmesi ve ceza yargılama sistemini kolaylaştırması sistemin olumlu yönde etkileyeceği iki ana etken olarak düşünülmektedir.

Anahtar Kelimeler: Birey Başarım Teknolojisi, Elektronik Performans Destek Sistemi, Neden Analizi, Davranış Mühendisliği Modeli, Değerlendirme, Kirkpatrik Dört Düzeyli Değerlendirme Modeli

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CHAPTER I

INTRODUCTION

1.1. Background of the Study

Over the past 200 years, theoretical and practical issues within work and workplace have turned into industrial era requirements demanding researches to work on people living in large groups and in large communities compared to those of the agricultural period based on isolation, independence, and importance of farming (Main, 2000; Van Tiem, Moseley, & Dessinger, 2001). The same revolution has been observed between the industrial and the information era regarding organizational structures and culture. In contrast to the main focus of work design and quality during the industrial era, information and people have gained importance in the information era for the workplace (Brown, 1996; Van Tiem et al., 2001). Indeed, when focusing on the work, the worker and the workplace performance has become one of the important features that organizations should take into consideration to be competitive (Main, 2000). Moreover, consolidation and usage of information by the people has gained importance leading to the necessity of maximization of their potential (Van Tiem et al., 2001). The importance of the human capital in organizations has increased more than ever before (Burke, 2008). As a result of today's complex nature of the workplace, information overload and a changing knowledge base become major problems for the organizations (McKay & Wager, 2007). They now have to manage the knowledge and data growing incredibly regarding information of new technology, suppliers, customers, markets, and alike (Enos, 2007). At the same time, they must collect and sustain essential resources to performers when and where needed (McManus & Rosset, 2006).

It is clear that organizations have altered sharply for the past 20 years owing to an increased pace of changes, globalization and computer technology (Salas & Kozlowski, 2010). Although organizations differ in many ways and there are various types of organizations, they share similar problems, challenges and opportunities (Enos, 2007). Nowadays, the predominant position in the world of business is to meet the needs of rapid growth, technological changes and expanding global competition (Korth & Levya-Gardner, 2006; Van Tiem, Moseley, & Dessinger, 2004). To sustain continual improvement, organizations should modify themselves, adopt improvements, and keep pace with innovation, change and adaptation (Burke, 2008). Therefore, effective performance by the work force is so important for organizations that they can survive and be successful in competition and fast-paced change era (Broad, 2000). Indeed, aligning their strategy, systems and processes with performance concept enables organizations to provide an enormous competitive advantage (Spitzer, 2007). In fact, learning, training and all development initiatives are vital ingredients in both establishing of human capital and achieving competitive objectives (Salas & Kozlowski, 2010).

The training as a new paradigm at the past was seen a panacea for problems in organizations when one-to-one instruction was considered inefficient in modern mass industrialization period (Gery, 2001). In that paradigm, people in the organizations were regarded as homogeneous and that is why a single approach was used to train them (Gery, 2001). Indeed, training has been used commonly as an intervention method to improve individuals' performances in teaching new ideas, knowledge and skills (Nguyen & Klein, 2008). Moreover, training programs have some obstacles to be accommodated in organizations to address changing performance needs; to illustrate, time limits and adequacy of sources and budgets (Cho & Yoon, 2010; Elliott, 1998; Gery, 1991; McKay & Wager, 2007; Rosenberg, 1990).

It is claimed that as long as training is the only solution for the performance problems, life will be so easy for organizations; however, following a systemic view and determining interventions for these issues are so complex (Stolovitch & Keeps, 1998).

Although efficient training programs are designed, developed and implemented for revealing the learners' excellent potential, training may not help trainees to close performance gaps because of the lack of other factors (Broad, 2000; Molenda & Pershing, 2004). As Sala (2003) asserts, only performance issues related to knowledge and skills can be solved with training. Training is not a remedy for other factors such as motivation or incentives, feedback mechanisms, job design, work processes or work environment, (Sala, 2003). Therefore, the main focus should be on the performance rather than education and training (Rosenberg, 1990).

The development of the Electronic Performance Support System (EPSS) is based on the assumption that training is not effective to solve many performance problems that most of the organizations have to deal with (Chang, 2004; McKay & Wager, 2007; Rothwell, 1996, 2005). An EPSS can be considered as an alternative to learning events such as traditional classroom or training programs (Maughan, 2005). It is possible to assert that demonstrating a superb performance in training design and delivery is not sufficient for organizations (Broad, 2000). This situation results from the fact that the complexity and the huge amount of information needed in the workplace cannot be addressed only by training programs (Williams, 2000). Therefore, analysis of performance problems and development of performance improvement interventions have become more popular among training and development communities, most notably within the training organizations (Ma & Harmon, 2006).

The concept of EPSS became popular among banking and consulting services in the early 1990s (Zhang, 2010). Both new advances in technology and widespread use of computer and information technologies in the organizations enabled the development and implementation of the EPSS in the workplace (Chang, 2004; McKay & Wager, 2007). To find a solution way for increased need for ongoing training and support needs; reduced cycle times to both learning and performance; provided collaboration, coaching and feedback address the EPSS (Gery, 2002). In summary, an EPSS could be used to improve training and keep out of or resolve performance problems encountered in the organizations (Chang, 2004).

To fulfill today's complex performance needs and demands, organizations should give place to a more complete human performance technology so as to strengthen training programs and provide required supports for employees with variables which have an effect upon their performance (Elliott, 1998; Hotek & White, 1999). Sustaining a competitive edge for companies, more organizations examine the increasing role of HPT and performance improvement processes (Elliott, 1998). Because an attainment of valuable and desired results is based only on systemic and systematic design, development and implementation of performance improvement systems, multiple performance technologies and HPT should serve as a basis for these vital demands formulated by the organizations (Watkins, 2007c, 2007d). With vast amounts of interventions offered by HPT, organizational efficiency and effectiveness can be improved (Molenda & Pershing, 2007).

As a conclusion, the growing need for a greater learning and performance requires organizations to entail implementing technological solutions so as to improve learning and performance (Gery, 2002). Today's competitive environment and constant change require workers to be up-to-date. In consequence of huge amounts of information that employees deal with in their job environments, it is sometimes difficult to grasp all the information required from them to do their job tasks (Williams, 2000). Moreover, today, job tasks are getting more complex. Hence, there is a growing need for support on these tasks in the organizations, and the performance support tools may be used to help workers meet these demands (Williams, 2000). That is to say, management and deliverance of performance play a vital role in providing effective and efficient services for organizations. Especially, various essential causes of problems and central concepts related with performance are the same for organizations (Enos, 2007). Regardless of being a government, a public sector or a non-for-profit organization, performance and performance improvements are at the core of their management agenda (Marr, 2008).

1.2. The Statement of the Problem

In general, human performance and nations' productivity can be improved with the help of fast advances in convergent technologies (Roco & Bainbridge, 2002). Computer and information technologies have a manipulative power and effect on the organizations in general. Mao (2004) indicates that support into working and computer-based training has been considered as emergent developments in the IT training business. Indeed, the processes of doing the job by the workers and the management styles of the organization have been changed with advances in telecommunications and computer technology (Van Tiem et al., 2001). Therefore, organizations should integrate computer and information technologies into their daily operations to improve efficiency and effectiveness of their end products or services (Marthandan & Meng, 2010). Advanced technology can be used for dealing with the complication of the organizations and expanding quality of using and mining data for performance related insights (Spitzer, 2007). With new advances in technology, Rosenberg (2006) makes a point of forming new and ample opportunities for blending learning and performance solutions in today's workforce productivity.

Owing to including infinitive components, organizations may be the most complex objects in the world (Spitzer, 2007). More specifically, when performance as a strategy or a direction or an approach is used for any purposes in government agencies, the term becomes more complicated, pluralistic, value laden and controversial by comparison with private agencies (P. Thomas, 2006). The performance of public organizations cannot be limited and regarded with only one dimension (Boyne, Meier, O'Toole, & Walker, 2006). As P. Thomas (2006) states, performance in government is regarded differently from private organizations in many ways. Firstly, performance is regarded as a progress directed by goals and objectives. Secondly, government performance is very explicit because of the fact that it can be followed or subjected to scrutiny by citizens, media or other interest groups.

Little research efforts have been made to investigate improving organizational performance and related factors in government and public agencies (Boyne et al., 2006; Brewer & Selden, 2000). One of the reasons for this situation is that the organization's performance as a concept is so difficult to define and measure (Brewer & Selden, 2000). Secondly, public agencies have to deal with a broad range of goals and thus must concentrate on multiple levels of performance (Andrews, Boyne, & Walker, 2006).

As a government agency, The Criminal Police Laboratories Department (CPLD) is affiliated to the General Directorate of the Turkish National Police (TNP). TNP is one of the biggest institutions in Turkey. With its approximately 190,000 personnel and being a nationally organized and centralized structure, serving two thirds of the population of the country, the organization is affiliated to the Ministry of Interior, and it functions within the municipal boundaries of all cities and towns of the country. The CPLD provides forensic services to support justice decision process by identifying crimes and criminals via scientifically examining and interpreting physical evidence during the crime scene investigation. The Crime Scene Investigation and Identification Unit (CSI) were affiliated to the CPLD at the end of the 2003 so as to increase the effectiveness and efficiency of police forensic science services. The crime scene investigation sections are located in the CPLD. There are a total of 200 crime scene investigation sections in the country. Most of these sections have been established quite recently since 1995. All 81 provinces and 342 districts have a crime scene investigation section and some districts have their own as well.

The main responsibility of the CSI sections are to examine crime scenes, collect and document evidence, and apply scientific examinations on fingerprints and latent prints and compare these with achieved prints for assisting in solving crimes, and lastly prepare detailed reports to be delivered to the investigation units. The CSI Unit is comprised of seven sections, crime scene investigation section, technical imaging section, biometrical data processing section, administrative section, bodily trace processing laboratory section, evidence preservation section, and quality and performance management section.

To increase the effectiveness and efficiency of the investigations of criminal activities, the CSI unit conducted a project, Performance Monitoring and Evaluation Unit, which was a part of the Twining Projects in 2003. As a result of this project, the CSI unit was affiliated to the CPLD and aimed to enhance with the development of new technologies. To serve these purposes, another project, Development of Electronic Performance Management Support System for Criminal Laboratory Officers (Project no: 107G037), was initiated with The Scientific and Technological Research Council of Turkey and Middle East Technical University in 2008.

In general, it is possible to assert that after 1990s, evidence-based policy has become an integral part of the decision making in public policy in many countries (Addicott & Ferlie, 2006). The legislations and frameworks have been designed by many governments to help government or non-profit organizations to improve their strategies regarding management of the performance (Marr, 2008). The governments have used performance data in terms of rating performance of their public agencies such as China, Australia, federal agencies in the USA, local governments and health services in the UK (Boyne et al., 2006).

The Turkish Government is also taking performance management seriously and has introduced a set of to measure the performance of public organizations. To illustrate, Law No. 5018 was issued on 10 December 2003 to regulate public organizations' performance management and performance measurement processes regarding their characteristics and scopes (Ozer, 2009). In the light of legal arrangements, public organizations have begun to prepare their performance management and measurement legislations (Eraslan & Tozlu, 2011; Ozer, 2009). Hence, more recently, New Promotion System Regulation (2012) for TNP personnel has been brought in. According to the relevant regulation, most of the promotions will be based on performance assessments of the personnel.

In that manner, the CSI unit has intended to integrate crime scene investigation, evaluation and documentation processes with the latest techniques and technologies and also to adapt oneself to the performance management and measurement legislations. An EPSS has been designed and developed to fulfill the needs and requirements of the unit. This dissertation encapsulates the performance analysis, design and development of the EPSS, and evaluation phases of the project mentioned above.

1.3. The Purpose of the Study

The purpose of the study was as follows: (1) to review organizational artifacts for identifying the CSI Unit's performance requirements and existing information (mission, vision, workflow processes, performance criteria, etc.); (2) to identify and prioritize the contributing causal performance factors required to be improved to meet the goal of efficient and effective forensic services and activities offered by CSI sections based on the Gilbert's BEM; (3) to design and develop an EPSS and components of the EPSS aligning with CSI Unit's mission, vision, performance requirements and prioritized performance factors that impact performance improvement.; and (4) to report the summative evaluation findings of an initial implementation to investigate the impact, effectiveness and perceived benefits of the EPSS on the performance of CSI officers based on the Kirkpatrick's Four Levels Model and Kaufman's Mega Planning framework.

1.4. Research Questions

This study aims to answer the following research questions within the flow of the HPT model, which performed as a theoretical framework for identifying root causes, designing and development of the EPSS and evaluating the effectiveness and impact of the intervention associated with forensic services and activities at CSI Unit:

1. What is the value of the CSI Unit's existing information to which the HPT initiative intends to contribute?
   - 1.1. What are the visionary goals of the CSI Unit?
   - 1.2. What are the missionary goals of the CSI Unit?
   - 1.3. What are the expected performance criteria?
   - 1.4. What are the basic workflow processes of the CSI Unit?
   - 1.5. Which extant and intrinsic data obtained from official sources can be used for the performance improvement initiative at the CSI Unit?
2. What are the root causes of the performance factors required to be improved in order to meet the goal of efficient and effective forensic services and activities offered by CSI sections?
   - 2.1. Are the root causes of the performance factors associated with the environmental support?
   - 2.2. Are the root causes of the performance factors associated with the repertory of behavior?
   - 2.3. How well do the three measures of performance factors (workplace, competency, and job value) predict perceived organizational performance of the CSI Unit?

2.4. How do CSI officers prioritize determined factors regarding both individual and organizational performance?

3. Does the EPSS intervention as a performance improvement initiative achieve the impact, effectiveness and perceived benefits expected on individual and organizational performance?
   3.1. What is the reaction of the CSI officers to the EPSS intervention?
   3.2. To what extent are the EPSS types and support components being deployed and used as they are planned?
      3.2.1. To what extend do the EPSS types (intrinsic, external, or extrinsic) contribute to the CSI officers' productivity?
      3.2.2. Which support structures are heavily used? Which are preferred?
   3.3. To what extent is the EPSS perceived to improve performance of the CSI officers?
   3.4. To what extent does the EPSS intervention help produce perceived valuable results for the CSI Unit?
   3.5. To what extent is the EPSS intervention perceived to have an impact on the society?
   3.6. What revisions are needed?

1.5. The Significance of the Study

The significance of the study is to contribute to the base of knowledge and practice for instructional designers, instructional technologists, government agencies, key stakeholders in business organizations, content developers, and evaluators, especially human performance technologists, researchers and practitioners in the HPT field.

In the literature, it is possible to assert that many concepts, methodologies and models have been developed in HPT field for fifty years. As Pershing (2006a) states that HPT as a field of practice should have domination over all parts of the world, not only be applied extensively in North America and European enterprise. Indeed, it might be required for the field to expand its influence and global effect. HPT is conceptualized as another American term without any scientific provision (Pershing, Lee, & Cheng, 2008a). Although HPT models give an opportunity of guiding performance evaluations and analyses, there is a need to research into usage of HPT models in developing countries (Newman, 2002). Therefore, case studies and action researches are important for the field as Doucette (2000) and Pershing (2006a) note that these studies point out and underline the significant effect of HPT for all types of organizations while adding and making value. Therefore, this study will describe the application of the traditional HPT model and other major models at CSI unit in Turkey.

Every year, new models and researches are developed to improve, challenge and expand the understanding of HPT (Main, 2000). Models are important for HPT because they both form the performance improvement initiatives and provide a framework for scientific and systematic inquiry (Burner, 2010). That is to say, modeling is part and parcel of the instructional design process (Wilmoth, Prigmore, & Bray, 2002, 2010). Because HPT is evolved from IT as asserted by different researchers, it is ordinary that field is grounded in models. In consequence of the following systematic approaches one of the characteristics of HPT, models used in the field enable practitioners to coordinate required procedures, determine the factors, design and implement interventions for assigned performance issues, and lastly evaluate the results (Pershing, Lee, & Cheng, 2008b). Although the cumulative effect of using so many models have appeared on the field, there is a growing trend toward the widespread usage the new models and then its value pending to be rediscovered or reinvented later (Amarant & Tosti, 2006). As a result, every practitioner tries to develop the model to follow for any performance improvement initiatives (Main, 2000). However, Richard Clark suggests that there is a need for the field to move directly to measure results and add research and evaluation to the validation process rather than developing new models (Pershing et al., 2008a). That is to say, there has been no systematic research to validate the major models of the field (Foshay & Moller, 1992, as cited in Sugrue, 2004).

To illustrate, although researchers and practitioners have been in agreement on how performance analysis should be done, there is not much research conducted regarding evaluation of models or techniques, that is practice rather than theory drives the headway in performance analysis procedures (Burner, 2010). This study will help bridge the gulf between theory of analysis and practice using the Gilbert's BEM by analyzing both performance and cause analyses of the CSI sections.

Similarly, lacking remarkable utilization of measurement, assessment and evaluation is considered as one of the weakness of the HPT (Pershing et al., 2008a). In many actual cases, evaluation of the interventions and solutions regarding organizational, team and individual performance has been given little attention through any performance improvement effort (Enos, 2007). Although developed evaluation models have changed to being used in the field, evaluation process has lagged behind the business and industry domains (Dick & Johnson, 2007). To fill the gap between theory and practice regarding using the evaluation models in HPT, Kirkpatrick's (1994) four levels of evaluation, the most eminent and leading evaluation model in HPT field (Bichelmeyer & Horvitz, 2006), and Kaufman's mega planning framework as a Level 5 are conducted for the evaluation of the developed intervention (EPSS) as a non-instructional solution for the CSI sections.

Both designing and development of the EPSS and evaluation of components and structures of the system are vital to be studied. It is apparent that the more an EPSS is implemented successfully in business and industry, the more growing awareness and acceptance of the EPSS in the workplace will be sustained for solving performance problems of the people in the organizations (McKay & Wager, 2007). In other words, as success stories resulting from the appropriate implementation of the EPSS are increased, many organizations may be willing to use the EPSS in their workplace settings. However, to date, little empirical research has investigated the determination of the most critical components of the EPSS for the organizations (Chang, 2004). Besides, an effectiveness of the EPSS has not yet emerged, nor has three fundamental types of EPSS (external, extrinsic, or intrinsic) been completely examined (Nguyen, Klein, & Sullivan, 2005). In other words, there has been little research in this area pointing out how embodiment of the components affects the benefits of an implemented EPSS (Chang, 2004). It is apparent that there is a need to investigate these demanding points. More specifically, there is a need to study selection of EPSS type (s) in organizations regarding guidelines and frameworks (Nguyen & Woll, 2006). Apart from components and types of the EPSS, a conceptualization of EPSS has not been examined so far (Mao, 2004). Although the depiction of the EPSS has grown, little empirical research has investigated the role of the EPSS in business and governmental organizations and also evaluation of their return of investment (Villachica, Stone, & Endicott, 2006). This study will help to clarify the extent to which each type of EPSS is effective to fill specified performance gaps and to determine the impact of the EPSS within the CSI unit and society.

Even a brief review of literature shows that many performance initiatives are centered mainly on improving performance of the police forces, health services, schools, universities, and cities (Marr, 2008). As to criminal police performance, the range, dimension and complications of criminal activity have enlarged and changed greatly these days, and this accounts for the fact that police performance should be increased to satisfy the trends (Pullen & Gallant, 2009). As Pullen and Gallant (2009) promote that idea that using HPT for police work leads to several advantages. For example, as they asserted, following principles of the HPT improves performance in police settings and also helps officers to do their job well. This study will help clarify and validate the major HPT models which aim to explore the CSI units' performance drivers and priorities, hence the proper intervention (EPSS) selection process, lastly the evaluation phase of the justifiable set of performance solutions by following the HPT model.

To sum up, there is a strong rationale for the design, development, implementation and evaluation of an EPSS in the organizations (Chang, 2004). Furthermore, as Mao (2004) asserts, the analytical, rigorous and empirical studies regarding the EPSS are needed in the field. The significance of this research is in its application and evaluation of the EPSS by following the flow of the HPT and other major models.

The study is also important since it makes a contribution to methodological problems of the field. Because HPT field has been rooted in behaviorism and cognitive psychology, the over-dependence of quantitative methods in research is so pervasive that this widespread use of the quantitative methods leads to misunderstanding about quantitative and qualitative methods in the field (Pershing, 2006b). Indeed, this dependency has also resulted in the missed opportunities in carrying out the needs analysis and evaluation researches (Pershing, 2006b). To identify and capture the complexity of the CSI unit, mixed methods research design was used for determining the performance factors and evaluating the overall impact of the intervention which points out the difference with these characteristics from other dominant research studies.

1.6. Definition of Terms

Performance: Performance refers to concrete, measured, valuable and useful accomplishments that CSI officers make while they investigate forensic services and activities.

Performance Analysis: It encompasses analyses of the CSI Units' performance prerequisites and existing information to provide a complete perspective on the CSI Unit by obtaining informative information about the organization. Performance analysis includes analyzing vision, mission statements, performance criteria, work processes, materials and regulations.

Cause Analysis: Cause analysis refers to determination of the root causes of the performance factors to be improved to fulfill performance deficits of the CSI sections. Using Gilbert's Behavior Engineering Model, these factors were identified in terms of environmental supports and person's repertory of behavior as Gilbert (2007) proposed.

Performance Factors: Performance factors cover the root causes of the performance issues of the CSI Unit which are associated with both environmental support and a person's repertory of behavior which Gilbert (2007) offered in his Behavior Engineering Model.

EPSS: The intervention used in the study is an integrated EPSS which represents task structuring characteristics of the CSI Unit via work processes and procedures, and allows CSI officers to get just-in-time, demand information, and guidance so as to alleviate the job performance (Gery, 2002; Ruyle, 2005).

Workflow Interface: The intrinsic performance support is provided with workflow application interface designed and developed for all CSI sections. Integrated the with main workflow and the actual job context, the interface both simplifies procedures that

CSI officers follow regularly so as to do their job and provides opportunities with links for the officers to get performance support.

Main Portal: As an external support component, the main portal includes links which serve the documentation about the CSI Unit. Short history of the unit, organization scheme, mission, vision, crucial regulations, educational materials and asynchronous forum are embedded in the main portal so that all CSI officers can read whenever required and share understandings about the job tasks and work based experience.

Support Portal: The support portal enables officers to get an external performance support by accessing help contents. Multiple means of access (performance criteria and search engine) and alternative views of the help content (support structures) are organized and provided to them when they want to receive performance support.

Support Panel: On–demand access to the extrinsic support system is provided with support panel which was invoked intentionally by clicking "?" button located in the interface by CSI officers. Running in a browser, six main support structures are presented in it to access the help contents.

Support Structures: The support structures are designed and developed to supply extrinsic and external performance support for the CSI officers. Having been invoked to get an extrinsic support, six main support structures are displayed in the support panel. Information cards, process maps, wizards and assistants, coaches and checklists, tips, frequently asked questions are the supports structures of the extrinsic performance support to read help contents. The external support system is similar to the extrinsic support system in that the same formats of the support structures are used in both. However, two additional structures, educational materials and visual, are embedded in the system.

Evaluation: Evaluation refers to summative evaluation findings of the implementation which measure the impact, effectiveness and perceived benefits of the EPSS on the performance of CSI officers based on the Kirkpatrick's Four Levels Model and Kaufman's Mega Planning framework.

CHAPTER II

LITERATURE REVIEW

2.1. Introduction

This chapter aims to summarize and synthesize the relevant literature with regard to the research questions proposed in the previous chapter. Theoretical perspectives of the study, the models used through the dissertation and relevant research studies were reviewed in this section. Firstly, the definitions of the performance, organizational and individual performance were presented. Secondly, definitions and purposes of the HPT field were introduced. Then, the HPT model and its phases were analyzed with the models used through the study. Gilbert's BEM and other models were presented with relevant studies. Thirdly, HPT model's other phases were reviewed respectively. As for the evaluation phase, Kirkpatrick's framework, Kaufman's Level 5 extension to the framework, and current models offered and implemented in the field were presented in detail. Then, definition and classification of the performance support systems, and also benefits and shortfalls of the EPSS were reviewed. The levels and components of the EPSS were also included in this review in detail. Lastly, the researcher presented related research studies in which the analysis, design, development, and evaluation phases of the EPSS used in a wide diversity of companies, industries, agencies and institutions.

2.2. Performance

Many definitions of performance have been offered by researchers, decision makers and academicians. Indeed, many performance related concepts have been used to explain the mystery of performance; to illustrate, organizational performance, individual performance, societal performance, information system performance, and hardware system performance (Swanson, 1999). Because performance is used by researchers and practitioners from different disciplines for the purpose of fitting their needs, it is impossible to assert a single view of the term (Swanson & Holton, 2001). Hence, there is not any agreement on a basic terminology and definition of the performance regardless of pervasive recognition and usage of the concept (Liao & Wu, 2009). According to Enos (2007), performance consists of concrete, certain, measurable, valuable and significant goals. Addison and Haig (2006) define performance as valued results. In Brinkerhoff's (2006) view, performance might be considered as a means to an end; moreover, it does not need to be good or bad. Simply put, performance is the useful results to be accomplished (Watkins, 2007d).

Performance as a phenomenon is studied by many different disciplines such as ethics, human resource management, sociology, economics, strategic management, industrial engineering and HPT (Swanson & Holton, 2001). Regardless of the strategy followed by different disciplines, there is a growing tendency to focus on performance with two approaches: (1) it is important to investigate what people need to do rather than to learn, and (2) acquiring skills and knowledge is a means to an end rather than being only the end (Robinson & Robinson, 1998). To address these approaches, performance can be viewed under three basic considerations: (1) performance can be considered as a natural outcome of individuals' purposeful activities, (2) performance is a tool to be used for assessing economic activities, and (3) performance is viewed as an instrument that leads to dehumanization (Laird, 2003). Despite different approaches and views that performance is a practice-based phenomenon for organizations, common agreements might be reached on the effectiveness of the term. For example, Rosenberg (1990) summarizes the three characteristics of the performance: (1) performance can improve as long as required supports are provided to the users, (2) it is really difficult to improve performance if it gets worse once, and (3) performance will be stable as long as it is supported by performance improvement systems.

In the literature, performance has been compared and contrasted with many views and approaches. The differences between performance and these terms such as learning and performing have been addressed to understand performance's unique advantages and disadvantages for organizations. To illustrate, learning can be defined as a process that includes gaining new or revised knowledge (Schwen, Kalman, Hara, & Kisling, 1998). Chyung (2008) advocates that learning is different from performance in that learning new knowledge may not guarantee that a new task is accomplished well or current performance is improved with the help of learning. Rather, performance is directly related to outcomes. In other words, a person may have knowledge of a specific topic and also demonstrate the required behavioral change by means of instructional support; however, this does not always mean that the person's performance would improve (Chyung, 2008). Similarly, the term performing and performance are different in many ways in spite of being linked to each other. While performing is about what we do, performance is the useful and valuable accomplishment (Watkins, 2007a, 2007d). To analyze the required accomplishments for organizations, two important concepts become crucial, organizational and individual performance.

2.2.1. Organizational Performance

In the HPT field, a good rule of thumb is to define organizations as a system where all parts are related (Addison & Haig, 2006; Addison, Haig, & Keary, 2009). According to Pershing (2006a), organizations are establishments composed of dynamic, political, economic, and social systems with regard to multiple targets shared by all people in the workplace. Van Tiem et al. (2001) view the organization as a collection of people who work together and having a same common ground, such as a mutual purpose and a specific set of objectives. Organizations consist of multiple components interacting mutually; so this explains why they are complex systems and interrelated factors should be linked to accomplish the purposes and goals of the organization (Pershing, 2006a).

Although only financial performance has been linked traditionally with organizational performance, operational and organizational effectiveness, organizational resources, knowledge management and capabilities are also to be considered as key variables of the organizational performance (Liao & Wu, 2009). To explore these key variables that every organization has may not be easy because organizational performance is hindered by many factors (Cokins, 2004). To remove these impediments, organizations' goals, strategies and other important features should be understood by workers; moreover, employees should have a chance to see that their contributions have an effect on the organization's results (Cokins, 2004).

Consequently, although many factors that have an influence on organizational performance have been investigated in the literature, the general consensus on what comprises a valid collection of organizational performance has not been reached (Kim, 2005).

2.2.2. Individual Performance

The organization is affected by the characteristics of the personnel, most notably adaptability, motivation, performance, and capacity; by the same token, the organization has an impact on personnel's work force and capital. However, it is clear that although organizations have different systems, such as operational, process, technical and financial, they are founded by and for the people (Pershing, 2006a).

As it can be recognized for each and every organization, highly educated and technically competent workers are demanded for a desired performance of the workplace environment (Van Tiem et al., 2001). This accounts for the fact that the formal and informal on-the job education and training systems should be delivered regularly in organizations so that the competencies of employees can be maintained and enhanced (Pershing, 2006a). Therefore, workplace applications and procedures should be linked with these educational initiatives (Pershing, 2006a).

In conclusion, HPT should focus on not only individual performance but also organizational, process and business performance because of the fact that alignment problems cannot be faced without concerning these concepts (Jang, 2008). As Brethower (as cited in Ferond, 2006) states, individual and organizational performance are completely linked to each other. To accomplish optimum performance for every performer, the resources, requirements, systems and policies of the larger organization, the procedures and criteria of jobs and skills, knowledge and attitudes of the individuals should be in harmony; that is, these factors should overlap to achieve optimal performance (Hale, 2007).

2.3. Human Performance Technology

The HPT as a field of practice and study has evolved mainly from the IT, general systems theory and behavioral psychology fields (Chyung, 2008; Main, 2000; Van Tiem, 2004). HPT has evolved over time with the work of a number of academic and professional practitioners (Chyung, 2008; Ferond, 2006). Beginning with 1950s and 1960s, the field evolved from the ideas and conceptualizations of B.F. Skinner (Binder, 1995; Pershing, 2006a). Therefore, most of the practitioners assert that HPT has evolved with the extensive works of academicians and practitioners whose researches and experiments were based on observable performance and behavior (Ferond, 2006). Behavioral theory and related approaches guiding the conceptual foundation of HPT have been selected as a framework by the pioneers of the field (Binder, 1995; Ferond, 2006; Van Tiem et al., 2004). After Skinner's experiments, Thomas Gilbert and Thomas Harless introduce the idea that both individual and organizational performance might not be affected by a well-designed instruction (Pershing, 2006a).

As many researchers assert that although HPT is evolved from the field of IT, IT remains a subset of HPT in terms of the scope of practices because an instruction might be one of the possible interventions for the determined problems in the HPT field (Chyung, 2008; Main, 2000; Molenda & Robinson, 2007; Wilmoth et al., 2002, 2010). Moreover, IT only deals with knowledge, skills and ability problems to select an appropriate intervention for the problems while HPT encompasses multiple interventions centering on the employee and organizational accomplishments (Main, 2000; Van Tiem, 2004). This difference has resulted from the paradigm shift emerged on the IT in that instruction is not a solution for all the problems in many cases (Chyung, 2008). Apart from instruction, other interventions should be employed to overcome problems regarding performance in such cases. This understanding leads to a paradigm shift from behavior-focused to performance-focused in the field (Chyung, 2008). Taking this change into account, it is asserted that the focus on performance rather than training and instruction has been one of the major orientations of the field of HPT (Robinson & Robinson, 1998).

After some improvements in air force experiments, informal interest group, The National Society for Programmed Instruction (NSPI), consisted of researchers from military training and universities was founded (Molenda, 2010). NSPI was established in 1962, and then its name was changed to National Society for Performance and Instruction (NSPI) in 1973 (Main, 2000; Molenda, 2010). In 1995, the association's name was changed again into the International Society for Performance Improvement (ISPI) (Molenda, 2010; Rosenberg, as cited in Chyung, 2008). More recently, the mission of the ISPI has been to improve productivity and performance in the workplace (Main, 2000). Today, the certified performance technologist program is offered by ISPI and ASTD (Van Tiem, 2004).

HPT comes to be known as a field of practice in the 1970s (Chyung, 2008; Stolovitch, 2007). Although it has been considered as a good idea in 1990s for organizations, it has offered to practitioners and academicians these days to draw a career in the organizations, most notably the U.S. coast Guard, the U.S. Navy, and IBM (Rossett, 2006). Today, all sizes and types of organizations, such as private businesses, government, social service, and nonprofit organizations, educational institutions, and the military may use a HPT for all their performance challenges and problems (Pershing, 2006a).

2.3.1. Definitions of Human Performance Technology

The definition of HPT as a field has been offered by different practitioners over the past four decades (Pershing, 2006a; Talaq & Ahmed, 2004). However, there is no single definition of HPT and that leads to confusion over the field (Main, 2000).

For Pershing (2006a), HPT is the discipline and the profession aiming at conducting ethically acceptable studies for improving productivity in organizations by means of planning and developing systematically effectual, comprehensive and results-oriented interventions. It is a systematic approach that can be used to improve both organizational and human performances (Morales, 2003). Van Tiem et al. (2001) define HPT as a set of methods, procedures, and strategies from which individuals, small groups and large organizations can benefit so as to sort out problems or identify possible conditions associated with the performance of people. Differently, HPT is the technology that contains some variables with the object of influencing human performance (Addison & Haig, 2006; Addison et al., 2009).

HPT as a field is mainly based on different research and evaluation approaches coordinating the research questions and methods based on them (Pershing, 2006a; Stolovitch, 2000). Although many research bases lie behind the field, practical experience and scientific research conventions must direct any HPT efforts to generalize its own specific laws and experiences (Stolovitch, 2007). Van Tiem et al. (2001) acknowledge that HPT is a science and an art. By seeing that analytical processes and methods are widely used by practitioners with a view of selecting and implementing solutions, HPT is a science. The methods and contents used in practice drive the HPT practitioners to follow a scientific theory through research (Stolovitch, 2000). On the other hand, it is an art by virtue of its dependence on people's feelings and ingenuity which comprise values, emotions, variability and idiosyncrasies (Van Tiem et al., 2001). In HPT, traditional approaches based on causality with its linear framework have been criticized, or rather; scientific propositions with measurable and prescriptive methods have been accepted for practices (Ferond, 2006). Simply put, practice and research must maintain for HPT (Stolovitch, 2000).

Although HPT as a term refers to the science of improving human performance (Miles, 2003), practitioners and researchers use HPT techniques and methods with a view of creating scalable and measurable appropriate interventions in alliance with active human performance system (Ferond, 2006). Moreover, technology as a term appeared in the HPT reflects the identification and resolution of performance problems (Watkins, 2007d).

The philosophical attributes of the field have been defined from different perspectives. To illustrate, Ferond (2006) views HPT as an evolving pragmatic philosophy appeared in 1950s. Moreover, the practice of the field is empirical (Dick & Johnson, 2007); in other words, the studies, practices and researches are conducted through observations and experiments and that is why the conclusions and judgments rely on the concrete data (Chyung, 2008). According to others, HPT is eclectic; that is to say, models, best practices, and theories from other disciplines are applied in all performance-improvement initiatives, most notably cybernetics, behavioral psychology, communications theory, information theory, systems theory, management science and cognitive sciences and neuroscience (Ferond, 2006; Morales, 2003; Pershing, 2006a; Stolovitch, 2007; Talaq & Ahmed, 2004). Moreover, many different terminologies have been given to the field, including data-driven (Pershing, 2006a), results-oriented (Chyung, 2008), measurement-oriented (M. Thomas, 2006), and theory-driven (Stolovitch, 2000). To sum, whatever philosophical labels are used, research-based practice, data and scientific methods and solutions build up HPT's inquiry efforts (Stolovitch, 2000).

2.3.2. Purpose and Goal of HPT

HPT is a field that incorporates processes which begin with desired results. Moreover, the main objects of these processes are to generate value for an organization itself, its employees, and the society it attends (Pershing, 2006a). More specifically, the purpose of HPT at workplace is to make the organization better through improving performance to produce the desired results (Addison & Haig, 2006; Brinkerhoff, 2006; Van Tiem et al., 2001). In other words, the ultimate goal of HPT is to solve complex performance problems originated in the organization and direct the organization in a positive way (Van Tiem, Dessinger, & Moseley, 2006).

HPT is defined as processes and tools with the aim of improving and enhancing individual, group, and organizational performances. Therefore, its principles and approaches can be applied within any organizational, work, and social improvement settings (Dick & Johnson, 2007). The practitioners have conducted researches into the genesis of HPT field to verify generally the effectiveness of the interventions proposed for specific points. Over the years, the theoretical and practical trends within HPT field have turned toward different paradigms emphasizing the human side of the problems, most notably seeking the complex nature of the people's experiences through their performance (Pershing, 2006a).

Simply put, HPT follows three main systematic processes. The first process for achieving goals is to analyze performance problems and their underlying causes. The second process comprises identification and implementation of solutions. The third process is on about evaluation of results for the organization (Van Tiem et al., 2001). To achieve these processes, the disciplined and systematic inquiries in the field of HPT entail conducting researches like well-organized prescriptions via asking questions and searching answers about performance in a way that supports defined collections of principles (Pershing, 2006a).

2.4. The HPT Model

The road maps for HPT practitioners are provided with the HPT model. The original model was developed by Deterline and Rosenberg in 1992 and enhanced via adding subtitles by Van Tiem et al. in 2000 (Van Tiem, 2004; Van Tiem et al., 2004).

Following both systematic and systemic engineering philosophies in any performance-improvement effort is vital to the success of the process (Chyung, 2008). HPT model has been used by professionals to find solutions to job-related problems. It provides a guide map for practitioners to deal with problematic issues and leave the performance problems out.

In HPT model, the desired performance improvement solutions might be achieved providing that professionals or researchers follow a five-step process: Performance analysis, cause analysis, intervention selection, design and development, intervention implementation and change, and evaluation (Van Tiem et al., 2001). In all phases of the HPT model, researchers and practitioners can have a chance to comprehend what performers do regarding their expertise in their work related tasks (Van Tiem et al., 2004). Not only for performers, as Van Tiem et al. (2001) note that following the HPT model has lots of advantages for organizations: (a) to determine gaps in a performance (b) to revise systems and processes (c) to maximize human capital, and (d) to sustain optimal employee performance.

In the literature, it is possible to see successful implementations of the HPT model in which organizations have been conducting researches and projects to solve performance problems or improve performance related issues. For example, The Royal Canadian Mounted Police (RCMP) has developed their performance improvement process to improve frontline performance and establish leadership facilities (Pullen & Gallant, 2009). Over a six year-period, RCMP has followed basic HPT phases and has initiated their effort in multiple sites, and finally RCMP concludes that operational readiness and performance in frontline policing could be improved with HPT via sustaining simple and structured ways.

Similarly, the U.S. Navy initiates the project addressing the principles of human performance technology for getting new aircrafts (Duke, Guptill, Hemenway, & Doddridge, 2006). The Human Performance System Model is used to analyze requirements firstly, and then to determine the solutions according to the obtained analyses data. The model consists of four quadrants: (1) defining requirements, (2) defining solutions, (3) developing components and (4) executing and measuring the results (Duke, et al., 2006). In the phase of defining requirements, requirements are emerged from missions. Performance standards and competencies of sailors are detailed as competencies, such as knowledge, skills, and abilities in the first quadrant. Then individual and organizational performance issues are identified and solutions are determined in the second phase. In the third quadrant, recommended solutions, training opportunities, engineering modifications and facility renovations, are implemented. The process ends in the last quadrant with the measurement and evaluation of the results (Duke, et al. 2006).

Using the HPT model developed by Van Tiem et al. (2001), Cennamo, and Lockee (2008) initiate a program revision process for the instructional Design and Technology program at Virginia Tech. Beginning with performance analysis; they identify the challenges for 35 full time doctoral students' instructional and non-instructional performance problems. Then, they conduct a cause analysis to understand reasons for change to the program. Dissertations and exams, research and networking, advising, mentoring and leadership are the five categories which are the probable sources of performance issues. The data is collected through observations, surveys, focus groups and benchmarking activities for these processes. Then, they design, develop and implement an intervention including an extensive program revision process. Apart from changing the department name from instructional technology to instructional design and technology, a substantial re-design process involves developing a web site and changing procedures, processes, information regarding curriculum, faculty and resources. After one year implementation time, they conduct a formative evaluation to identify students' feedback on the revised program and other intervention factors. Data is collected through surveys. Results point out the positive outcomes to the program for all aspects of the intervention.

In short, HPT model is comprised of performance analysis, cause analysis, intervention selection, design and development, intervention implementation and change, and evaluation phases. As seen from successful implementations, all phases can be both followed successively or applied separately to achieve desired results.

2.5. Analyzing Performance

By virtue of organizations" complexity, performance and productivity are affected by many elements (Broad, 2000). All the factors affecting, supporting, helping or also preventing human performance in any organizations should be diagnosed in analysis processes (Main, 2000). As Van Tiem et al. (2001) warn, it is vital to concentrate on domains of performance for an organization to achieve better results.

The purpose of the analysis process in the field has been suggested with different perspectives. Generally, the main objective of the analysis is to determine the characteristics of the outstanding performance (Rossett, 2006). From Van Tiem et al. (2001) perspective, the focus should be determination of the performance problems and causes rather than symptoms for these analyses. Problem and cause identifications in analysis process are considered as a sub process of performance analysis (Schwen et al., 1998). Indeed, analysis of the performance problems and the root of these problems are at the core of HPT field (Brinkerhoff, 2006). To sum, although performance analysis includes discovering all performance drivers or obstacles and offering a solution package grounded on what is learned from the analysis processes (Rossett, 2009), the scope and depth of the analysis vary with the characteristics of the intervention being implemented (Molenda & Pershing, 2004).

One of the goals of analysis is to ascertain both the organizational and individual factors that alleviate or improve the current performance (Rossett, 2006). Rosenberg (2006) affirms the view that performance analysis should include defining both business and human issues. Moreover, the linkage between these two should be established addressing human performance issues, both individual and organizational. In this initiative, practitioners should ask "why questions" and the answers could be categorized and analyzed in several ways (Pershing, 2006a). In doing so, recommended solutions are based on a valid and realistic measurement rather than assumptions, chance and pure guesswork (Rosenberg, 2006). The results of the data gathered from the analysis are used to decide on appropriate interventions and evaluation of these interventions (Rossett, 2006).

There are various approaches to performance analysis in terms of their scope and purpose in the field (Watkins, 2007d). While some approaches focus on performance only at individual levels, others address both organizational and societal perspectives (Watkins, 2007d). Different performance analysis models and approaches have been developed and implemented in the field. Regardless of the approach followed, analysis should be based on factors which have an effect on results (Watkins, 2007d).

As Van Tiem et al. (2001) warn, performance and cause analyses are the first steps in a HPT model. Therefore, it is important to reach an agreement on the problem and its cause before selection and implementation of the interventions. This phase is vital for organizations to select the right set of solutions to improve performance (Rosenberg, 2006; Rothwell, 1996, 2005). Moreover, this process is also important for the evaluation of the intervention as most of the failures concerning evaluation of the proposed interventions result from insufficient data collection in analysis phase and missing information about effective performance (Enos, 2007).

2.5.1. Performance Analysis

The performance analysis is the process that takes part in the first stage of HPT model. Van Tiem et al. (2001) define performance analysis as a process which involves the identification of organization's performance prerequisites and comparison of these requirements with objectives and capabilities. In Anderson's (2010) view, performance analysis is a preliminary step of performance problem identification and recommendation process for the next phase of the performance intervention effort. As Svenson (2006) recommends that any performance improvement endeavors should begin with the performance analysis before any solution is offered. This common tradition is valid not only for a simple module but also for complex interventions. As a starting point for any performance-improvement initiatives, it is vital to obtain data about what is required, what is happening, what is not, and why for organizations (Rossett, 2006).

Following a systematic performance analysis process provides a complete perspective about organization and help practitioners to verify selected performance technologies and interventions (Watkins, 2007b). As Van Tiem et al. (2006) state that analysis phase of the improvement process consists of analyzing the organization's vision, mission, goals and the environment, worker, working environment, and conducting gap and cause analyses. Gilbert (2007) offers that the data generated and stored in the organization should be analyzed so as to obtain sufficient, informative and reliable information about the organization. Then, the tools and materials should be searched. Besides employees' knowledge, skills and abilities, factors such as materials, tools, information, processes, procedures and also policies, mission and values are other elements to be analyzed within work systems and subsystems (Main, 2000). This process is important in that as long as performers internalize the goals of the organization, the results can be highlighted to support these aims and goals (Sala, 2003).

It can be concluded that the ultimate goal of the performance analysis is to find out the most important possibility for improving performance (Gilbert, 2007). In doing so, the precise nature of the performance barriers and the required options for the organization can be determined through analysis (Rosenberg, 2006).

According to Van Tiem et al. (2001, 2004), performance analysis is of three types: organizational analysis, environmental analysis and gap analysis.

- Organizational Analysis

Any human performance initiative should be prefaced by clarifying the current and future goals of the organization (Robinson & Robinson, 1998). Therefore, examination of organization's vision, mission, goals, strategies, goal statements and similar documents are the first step in the performance analysis phase of the HPT Model (Van Tiem et al., 2004). This approach may be a good starting point for all steps because it enables practitioners to see the whole context of the improvement initiative (Brethower, 2007). These purpose, goals, vision, mission and values are important for any endeavor since they establish the boundary circumstances for the organization (Marr, 2008). They represent the organization's directions that point out the desired state of performance (Van Tiem et al., 2004).

The visionary goal of the organization expressed in vision statements represents organization's aims and provides desired outcomes (Marr, 2008). In a one-sentence commitment, organizations formulate their desired future state (Moskowitz, 2008). Organization's vision of the work is produced by organizational values. These values are comprised of concepts and beliefs which shape the culture of the organization. Most of the culture might be unwritten and created without consultancy among people in the organization. Regardless of not being explicitly provided, culture might be beneficial for all and help create a positive work environment (Van Tiem et al., 2001).

As for mission statements of the organization, the core purpose of the organization is described in that mission statement which represents why an organization exists and what it does via its product or service (Marr, 2008; Moskowitz, 2008). In other words, missions consist of accomplishments which can be used for the definition of the institutions or organizations (Gilbert, 2007).

Mission and vision identify the organization's purpose and goals (Addison & Haig, 2006). While the vision statement displays where the organization wants to head, the mission reveals what individuals are about and the nature of the organization they are in (Hale, 2007)

The vision, mission, values, criteria and the goals of the organizations are so important that they should be used to determine the desired performance (Swanson & Holton, 1999; Van Tiem et al., 2006). Especially, mission-related performance outcomes should be determined in order to assess performance results; therefore, information about the organizations' mission, vision and other related documents (formally documented or not) should be obtained for guidance (Rothwell, 1996; Swanson & Holton, 1999). This alignment process is important for three reasons. First is that analyzing organization's extant data gives direction to the performance analysis process (Burner, 2010). Secondly, exploring organization's goals directs the evaluation strategy of the initiative (Elliott, 1998). Lastly, employees do their job well when they have any interpretation about the organizational goals (Elliott, 1998).

As a consequence, the mission and vision of the organization and the basic and most important goods or services of the organization are key variables to be clearly defined in performance analysis process so as to match the intervention with these core outputs (Main, 2000; Rothwell, 1996; Swanson & Holton, 1999). Moreover, for a performance improvement, mission, process, sub-systems, and individuals are vital domains to be analyzed for organizations (Addison & Haig, 2006; Kaufman, 2006; Van Tiem et al., 2001). These documents enable practitioners to align any performance initiatives for providing practical guidance to selection, design, development and implementation of the performance technologies (Elliott, 1998; Watkins, 2007a).

- Environmental Analysis

Organizational environment (external performance support), work environment (internal performance support, e.g. available resources, tools and policies), the work itself (job design, work flow, ergonomic issues and procedures), and the workers (skill level, knowledge base, motivation, and expectations) are the components of the environmental analysis that sustains information on actual performance. Analyzing the organizational environment includes determining the external stakeholders for organizations and changing competitive challenges confronting the organization (Van Tiem et al., 2004). As for analyzing work environment, the process requires practitioners to examine resources and tools, policies, and other internal support mechanisms (Van Tiem et al., 2001, 2004). While work analysis focuses on work flow, procedures, responsibilities and ergonomics, worker analysis seeks to understand performers' current knowledge, skills, motivation, expectations and capacity regarding what they do in their job (Van Tiem et al., 2004).

- Gap Analysis

As a last step of the performance analysis, the gap analysis component of the HPT model tries to determine performance gaps between the desired and the actual state performance (Van Tiem et al., 2001, 2004).

2.5.2. Cause Analysis

As a standing principle of HPT, any HPT initiative starts with well-designed and complete analysis of root causes of performance issues (Brinkerhoff, 2006). In the literature, drivers, barriers and obstacles have been used as synonyms for causes (Rossett, 2009). In the general sense, cause analysis ascertains why the performance gap exists in the organization (Van Tiem et al., 2001).

Rothwell (1996, 2005) reviewed the research literature on the possible causes of all human performance problems. Although the labels and names are changed, theorists and researchers, such as Robert F. Mager and Peter Pipe, Thomas F. Gilbert, Geary A. Rummler and Alan P. Brache, assert three possible causes of the performance issues. While Robert Mager and Peter Pipe label these as skill and management deficiencies and a combination of them, Thomas Gilbert uses deficiencies of knowledge and execution and the combination of them. Similarly, training and management needs and the combination of them are also determined by Rummler and Brache as causes of the performance problems (Rothwell, 1996, 2005). According to the Robinson and Robinson's (1998) classification, needs are of four types. While business needs are about the goals of the unit, department and organization, performance needs encapsulate the on-the job requirements. After businesses are accomplished, performance needs which are the specific job requirements and procedures that identify what people must do to obtain achievable results come to play (Robinson & Robinson, 1998). The third type, the learning needs can be defined as the skills and knowledge that people should have for doing their job. The last type is work environment needs which specify all the systems and processes located in the organization (Robinson & Robinson, 1998). Swanson (2007) asserts differently from other considerations that performance variables can be considered as the possible causes of performance issues and there are five variables that should be investigated: mission and goals, systems design, capacity, motivation and expertise. In Rossett's (2009) view, the performance drivers are four types: (1) skills, knowledge and information, (2) motivation, (3) environment, tools and processes, and (4) incentives. Lastly, Ross (2003) classifies conditions, standards, incentives, capacity, knowledge and skill, measurement, and feedback as seven performance drivers that affect performance in organizations.

Well-organized and reflective evaluation is needed for the analysis of this phase, since HPT initiative cannot be successful unless the analyses of the causes of the performances issues are determined appropriately (Brinkerhoff, 2006). Hence, the root causes of the performance issues should be understood. Otherwise, any solution might be premature (Rosenberg, 2006).

2.5.2.1. Behavior Engineering Model (BEM)

The Behavior Engineering Model (BEM) was developed by Thomas Gilbert and represented in his book, Human Competence: Engineering Worthy Performance (Gilbert, 2007). Gilbert's workshops, run in the 1960s and 1970s, structure the main framework of the book (Miles, 2003). In his book, Gilbert (2007) presents three leisurely theorems. The first theorem is about the worthy performance which assists in the measurement of performance meaningfully (valuable accomplishments and costly behavior). In his first theory, he certainly distinguished between a behavior and an accomplishment which becomes an outcome of the certain behavior (Chyung, 2005; Swanson & Horton, 2001). The second theorem gives information about the potential for improving performance (Cox, Frank, & Phillibert, 2006; Gilbert, 2007; Swanson & Horton, 2001). The third theorem is about the BEM; Gilbert (2007) calls it the management theorem. It is a general framework to find out the causes of competence and incompetence. The different levels of accomplishments are also covered in his book.

He offers a systematic approach to explore real and greater leverage for finding interventions which help close the performance gaps from a behavioral perspective (Burner, 2010; Chyung, 2005). According to the Gilbert (2007), six components are vital to an occurrence of the behavior (Table 2.1). While three of the factors represent the environmental supports, the other three are about the person's repertory of behavior (Gilbert, 2007). Skinner's three term contingency is reflected in the model in that while information is represented as discriminative stimuli, instrumentation and motivation correspond to responses and consequences respectively (Austin, Olson, & Wellisley, 2001; Binder, 1995; Burner, 2010). These six major components may be used as variables affecting the workplace performance (Stolovitch, 2007).

Table 2. 1

Six Factors in The Behavior Engineering Model (Gilbert, 2007, p.88)

	Information	**Instrumentation**	**Motivation**
Environmental Supports	*Data* 1. Relevant and frequent feedback about the adequacy of performance 2. Descriptions of what is expected of performance 3. Clear and relevant guides to adequate performance	*Instruments* 1. Tools and materials of work designed scientifically to match human factors	*Incentives* 1. Adequate financial incentives made contingent upon performance 2. Non-monetary incentives made available 3. Career-development opportunities
Person's Repertory of Behavior	*Knowledge* 1. Scientifically designed training that matches the requirements of exemplary performance 2. Placement	*Capacity* 1. Flexible scheduling of performance to match peak capacity 2. Prosthesis 3. Physical shaping 4. Adaptation 5. Selection	*Motives* 1. Assessment of people's motives to work 2. Recruitment of people to match the realities of the situation

Gilbert's most well-known and important contribution to the field is the concept of the engineering human performance (Chyung, 2008). Coming from the tradition of behavior analysis (Binder, 1995), he is the first person who emphasizes that the whole work environment should be analyzed to understand why people do not or cannot perform (Rosenberg, 2006). The model provides a broad perspective of the performance approach to correct current human performance issues or specify possible performance improvement solutions (Rothwell. 1996). He claims that the greatest shortfall of the performance results from the work environment and not from the lack of knowledge or skills (Main, 2000). As Ferond (2006) emphasizes that Gilbert's BEM adopts a different approach to analysis of the organization. Linked with the system approach, it provides an overview of current performance of the organization. Moreover, Rothwell (1996, 2005) labels the model as the classic holistic model that as it presents a broad perspective and a big picture view of the performance for HPT.

Individual and organizational performance barriers are identified through a systematic approach in the model so that the underlying causes of the performance shortfalls can be identified as a framework (Chevalier, 2006). According to Gilbert's BEM, people's behavior can be specified by worthy or worthwhile performance (Van Tiem et al., 2001). BEM is based on environmental support and the employee's repertory of behavior for the purpose of founding structures focusing on performance outcomes (Van Tiem et al., 2001).

Using the BEM, performance can be changed via altering the behavior repertory itself or changing the environment (Gilbert, 2007). In order to improve performance, BEM focuses on changing work environment standpoints such as information resources, incentives, knowledge, capacity, and motives (Van Tiem et al., 2001).

2.5.2.2. Benefits of the Model

BEM enables practitioners to describe the performance issues as regards to performance gaps or performance improvement initiatives (Ferond, 2006). Practitioners have a chance to obtain required data using the BEM regarding performance issues at both the organizational and the individual levels (Ferond, 2006). As Gilbert (2007) adds that the BEM may be used as a diagnostic tool for understanding where the performance gap exists and developing a gap closure strategy offering effective solutions. It can be also used to assist determination of key critical factors in organizations (Crossman, 2010). Duman, Chyung, Villachica, and Winiecki (2011) assert that complex situations can be easily understood and discussed when BEM is used as a tool. Miles (2003) expresses the idea that Gilbert's model keeps its pragmatic approach up-to-date for any performance improvement initiatives.

The causes of competence and incompetence can be identified with the BEM, especially knowing that deficiencies in performance result from the inefficiencies at management of the six factors represented in the model (Chyung, 2008). More specifically, the model facilitates the selection of the most appropriate interventions and solution regarding performance problems with a systematic and data-based decision making methodology (Binder, 1995; Ferond, 2006). To illustrate, people may know how to do something about their job; but, they cannot perform very well because of the environmental issues such as inadequate tools, broken work processes, or difficulties or poorly designed job tasks. In this situation learning should not be a panacea for this problem (Rosenberg, 2006). Indeed, human performance cannot be improved as long as the performance support factors are not promoted, even when special training programs are provided to the employees (Dean, Dean, & Rebalsky, 1995).

2.5.2.3. Levels of the Model

Performance shortfalls are due to inadequacies of the behavior repertory, environmental supports or both of them (Gilbert, 2007; Rothwell, 1995, 1996, 2005). However, as Gilbert continues to say that the ultimate causes result from the management system. Rather than the ultimate causes, Gilbert's theorem deals with several kinds of behavioral conditions which can be manipulated easily in the organizations (Gilbert, 2007).

To determine which part of the behaviors can be altered to improve performance, Gilbert (2007) asserts that all human behaviors have two important characteristics having an equal importance: (1) a repertory of behavior, (2) a supporting environment (Table 2.1). In other words, either the lack of environmental support or lack of repertory of behavior for the performer might be attributed for possible causes of the performance (Van Tiem et al., 2001). According to the Gilbert's theory, behavior can be defined as a consequence of both repertory and environment. Therefore, it is possible to assert that either changing a person's repertory or revising the supporting environment or doing both of these options may be a more efficient strategy when inadequate behaviors for competent performance are determined in the organization (Gilbert, 2007).

2.5.2.3.1. Lack of Environmental Support

The top row of the BEM describes factors associated with the work environment. It signifies that probable causes might stem from management related supports, such as tools and resources, from motivational factors such as incentives or rewards, and required information and feedback so as to perform the job correctly (Dean et al., 1995; Van Tiem et al., 2001, 2004). In fact, the needed information consisting of how to perform a job is questioned at the organization level whether provided by the work environment or not (Ferond, 2006). Moreover, sufficiency of the resources (tools, materials, time) and the types of motivational factors are also questioned at the organization level (Ferond, 2006).

- Data

Data and information is a sine qua non of human performance (Van Tiem et al., 2004). Up-to-date data and information regarding organizational policies, job or task procedures and performance expectations are required for performers to do their job well (Van Tiem et al., 2004). Moreover, performance feedback and guiding performers on the result of their performance are also important features of the work environment (Burner, 2010).

- Instruments

Resources and tools are needed so as to support or help performers doing their job tasks. Science-based tools and materials (Burner, 2010) and also environment support (Van Tiem et al., 2004) have an impact on performers' performance. While resources encapsulate all materials, time and personnel, tools are the required instruments such as computers and software to be used by workers while performing their job (Van Tiem et al., 2004). Van Tiem et al. (2001, 2004) state that while tools should be available and accessible to all performers and disseminated safely and efficiently through all the organization, resources should be adequate and in sufficient quality for better performance.

- Incentives

Financial, non-monetary, career development opportunities (Burner, 2010) and consequences, and incentives or rewards (Van Tiem et al., 2004) form this level of support. It is important that performers' performance is affected positively in taking positive consequences and incentives and minimized when it is exposed to negative factors (Van Tiem et al., 2004).

2.5.2.3.2. Lack of Repertory of Behavior

The three cells along the bottom row of the BEM describe factors related to the worker. It signifies that possible causes might be the origin of worker's skills and knowledge of the job, their capacity or the desire to perform the job well (Dean et al., 1995; Van Tiem et al., 2001). In fact, Gilbert's model seeks answers to the questions about why employees do not know, cannot do or will not do regarding their knowledge, capacity, and motivation to their job (Ferond, 2006). Moreover, accomplishment should be measured rather than human behavior in all performance related efforts (Gilbert, 2007). In other words, performance involves more in displaying determined behaviors. However, behavior is also important in that efficient behavior is one of the main components for attaining worthy performance (Gilbert, 2007).

- Knowledge

The first cell of the lack of repertory of behavior row is knowledge. Determining skills and knowledge deficiencies are not easy in that phase (Van Tiem et al., 2004). When training is needed for employees, this factor brings into play (Dean et al., 1995). Knowledge and expertise are fundamentals for organizations to succeed in their goals since people have to know and be competent at their jobs. That is why they are considered as critical prerequisites to performance (Swanson & Holton, 1999). In other words, workers need tools and resources to do their works well (Addison & Haig, 2006). As Wallace (2006) notes that the terms in human related factors such as awareness, knowledge, or skills might vary in the analysis researches. One possibility to be examined in this factor is that performers might forget the required skills and knowledge when they do not use them frequently (Van Tiem et al., 2004). Another possible factor is valid when workers do not have a chance to use needed skills and knowledge for some time (Van Tiem et al., 2004). Regardless of the different types and names, practitioners should be aware of the performers' necessities in their investigations.

- Capacity

The capacity, the second cell of the row, is about the ability of the persons to do their job well (Dean et al., 1995). This component reflects a right coordination between the workers and the job requirements (Van Tiem et al., 2004). Therefore, analyzing organization's workplace and work environment support opportunities is vital for this component (Van Tiem et al., 2004).

- Motivation

The motivation as a third factor is related with the work environment (Dean et al., 1995). Unless performers are motivated or their expectations met, they cannot perform their job as at the intended level (Van Tiem et al., 2004).

In short, the aim in improving human competence by changing behavior is to decide which of the strategies, repertory or environment, is more effective (Gilbert. 2007). The information, tools or the incentives that support performance can be improved or training or other devices can be used so as to change directly the person's repertory of behavior or both of these options can be taken into consideration to improve human competence (Gilbert, 2007). In most cases, employees might not improve their performance on their own. Therefore, they should be supported in whatever is needed about their job with the help of their colleagues or the organization in which they work (Brinkerhoff, 2006). Where the employees have a difficulty in knowing how to perform, learning and skill building might be a fundamental solution for this situation (Addison & Haig, 2006). In that manner, as Gilbert (2007) insists that the sequence for diagnosing behavioral deficiencies should follow the environmental support with the behavior repertory. Satisfying the employee related needs might facilitate to handle environmental factors that lead to intended consequences (Wallace, 2006).

2.5.2.4. Adaptations to Gilbert's BEM

Although new models and approaches have been developed, there is a tendency to value classical models in the field. With some minor modifications, they are considered as workable for the local situations (Pershing et al., 2008b). In the literature three models which are derivatives of Gilbert's BEM have attracted the attention: The Updated Behavior Engineering Model, The Six Boxes Model, The Performance Analysis Flowchart and The Synchronized Analysis Model (SAM).

Using the framework of the Gilbert's BEM, Chevalier (2006) develops The Updated Behavior Engineering Model. The updated model is similar to the original BEM in that it concentrates on the environmental and individual factors which have an effect upon the performance (Chevalier, 2006). However, the subsections of the environmental and individual factors are labeled in sequence as information, resources and incentives for environment and knowledge-skills, capacity and motives for the individual rather than for the information, instrumentation' motivation, knowledge, capacity and motives appeared in the original model (Chevalier, 2006).

As for the environmental factors, three types of performance support can be analyzed: (1) information: this factor consists of expectations, needed guides to do work, and feedback mechanisms; (2) resources: materials, tools, time and processes required to do any task form this category; (3) incentives: this factor comprises financial and nonfinancial incentives (Chevalier, 2006)

Like the environmental ones, individual factors give three types of support: (1) motives: this type of support entails aligning with the work environment and individual motives; (2) capacity: this factor analyzes the condition that whether employees are able to learn and perform what is necessary to do their tasks and jobs; (3) knowledge and skills: the required and needed knowledge and skills to achieve any tasks about the job form the basis of this factor for employees (Chevalier, 2006).

The six boxes model was developed by C. Binder in 1998 (Binder, 2009). The model as a performance improvement tool provides practitioners use in performance analysis, training support and any program implementation (Binder, 2009). The six boxes model is exactly like Gilbert's BEM in that they both consist of six factors (Burner, 2010). Like the BEM, the factors are grouped under two major headings, the environment and the individual. While expectations and feedback, tools and resources, and consequences and incentives constitute the environment component, the individual factor is made up of skills and knowledge, selection and assignment, and motives and preferences (Burner, 2010). The six boxes model is different from the BEM in that it does not involve any concepts related to Skinnerian terminology and there is not any direct linkage between components (Burner, 2010).

The performance analysis flowchart model was offered by Robert F. Mager and Peter Pipe (Burner, 2010; Wilmoth et al., 2010). Multiple categories offered in the model are used for performance obstacles and it grounds on the behavior influences (Binder, 1998). Different from BEM, Mager & Pipe's model gives a direction for problems rather than determination of the causes (Burner, 2010).

In general, environmental levels were integrated into Gilbert's BEM in the SAM. Marker (2007) suggests in the SAM that performance issues resulting from the environmental levels cannot be specified in the Gilbert's BEM. Therefore, BEM's general environment level should be expanded in a way to link job, organizational and external environment levels to the Gilbert's environmental support layer while the repertoire of personal behaviors level is identical to the BEM (Marker, 2007). To improve performers' efficiency and effectiveness in revealing performance obstacles, it is possible to assert that the organizational level is stretched in the SAM via merging and synchronizing causes with information depending on external factors (Marker, 2007).

2.5.2.5. Models Currently Used To Identify Causes of Performance

In the literature, researchers and practitioners have developed and implemented lots of models to identify organizations' causes of performance. For example, Dean et al. (1995) conduct a study using the Gilbert's BEM to identify the factors which make major contributions to the work performance of 850 managers, employees, members of professional societies and students in a graduate management program. The two year-study shows that the major contribution of participants' work performance is affected by environmental factors. In other words, there is a need to make an improvement on environmental factors of information, resources or incentives (Dean et al., 1995). Especially, managers and employees from different sectors express that information and incentives make a major contribution to their job performance.

Newman (2002) applies performance analysis to the Ministry of Health in Togo as a post-training performance evaluation. Using different data-collection methods and instruments such as interviews, record reviews, questionnaires and checklists, performance factors and barriers are categorized under two headings: external and internal. Five performance factors are grouped under the external category heading. While organization systems and incentives are categorized under the environmental subheading, cognitive support, tools and physical environment are grouped under the resource subheading. According to the model, internal heading is constituted by skills/knowledge and inherent ability.

Addison and Haig (2006) offer a framework, the Performance Map, to identify the causes of performance-related problems. Based on their model, the structure of the organization, the motivational levels of workers, the external and internal conditions of the organization and learning as an indicator of employees' proficiency are the four key quadrants that should be investigated while diagnosing the performance issues in organizations (Addison et al., 2009).

Another tool to find probable sources of performance problems, the iceberg, has been offered by Addison and Haig (2006). According to the model, information about organizational levels, structures and goals (including mission, vision and values), management practices, priorities, standards and procedures (including work processes and the connections), tools, resources and work environment should be gathered to be revealed (Addison et al., 2009).

Joe Harless, a student of Gilbert, develops a performance improvement process model (PIP) (Stolovitch, 2007; Talaq & Ahmed, 2004). The PIP involves conducting front-end analysis, stating and analyzing objectives, designing, testing and evaluating the intervention (Talaq & Ahmed, 2004). Harless's Model evolved from the BEM adds the idea that personnel selection category is also embedded in the analysis so that the redesign of the work place may be reflected in immediate changes of the job requirements (Ferond, 2006).

Rummler and Brache's model, anatomy of performance, may also be considered as the extension of the Gilbert's and Harless's models in regard to analyzing the nature of the organization, that is to say, the organizations' direction as well as issues in procedures are clarified at the process level (Ferond, 2006; Talaq & Ahmed, 2004). In the model, they claim that the workplace performance is affected by six factors: (1) clear performance specifications, (2) required support in the workplace, (3) clear outcomes, (4) feedback mechanism, (5) individual capacity, (6) required skills and knowledge (Broad, 2000; Swanson & Holton, 2001).

In the "Modeling Mastery Performance" model by Wallace (2006), two categories, the human and the environmental enablers, are used to assist the determination of the performance gap. In the model, awareness, knowledge, skill, and physical, intellectual, psychological attributes and personal values constitute the human enablers that should be evaluated and documented as an output. By the same token, environmental enablers' requirements consist of data and information, materials and suppliers, tools and equipment, facilities and grounds, headcount and budget, and culture and consequences (Wallace, 2006). These major components of the performance variables should be taken into consideration in the analysis stage. Moreover, the process itself as design and redesign strategy is also involved in the model. Wallace (2006) continues by saying that all these components or any two of them might be needed in performance-improvement efforts to be analyzed to improve the overall performance.

In providing reasonable arguments for the determination of the performance enablers, Wallace (2006) states that all the categories specified by other academicians or researchers are not needed to be used in analysis efforts. In fact, it is more convenient that these factors or variables should be adapted to the real research situations rather than the adoption of the whole set of categories.

Bichelmeyer, and Horvitz (2006) identify six primary performance variables that might affect human performance in a specific context. To be a theoretical framework for their evaluation model, commonly known as the logic model, they present a framework for comprehensive performance evaluation. According to their framework, six main categories are listed and the subcategories of these factors are detailed: (1) inherit capabilities (physical, reasoning, emotional and expressive abilities and internal motivation), (2) knowledge and skill supports (education, training, modeling, practice, documentation, job-aids, self-study), (3) incentives (expectations, feedback, criteria, reinforcements, compensation, perceived value of work, respect and trust), (4) organizational systems (goals and objectives, accountability structures, policies, process management, position descriptions, job aids, performance monitoring systems, rewards and recognition systems, satisfaction measures and improvement plans), (5) tools and resources (any physical item a performer needs to perform such as office supplies, equipment, computers and software, clothing and transportation) and (6) environmental elements (safety, comfort, fit to performance and access to resources).

The Total Performance System (TPS), developed by Dale M. Brethower, is the model to be used for identifying factors related to workers' role and the organizational functions with analyzing internal and external feedback to determine organizational performance (Brethower, 2007; Talaq & Ahmed, 2004).

The performance clock model, developed by F & M Innovative Solutions, is the diagnostic model to be used for analyzing performance systems of the organizations (Main, 2000). The model consists of four components: training, incentive and motivation, environment, and TIME support mechanism. While the right training opportunities are questioned in the training component, external and internal factors are analyzed in the incentive and motivation component. The environment component is about the extrinsic environmental factors to be diagnosed in the model that support mechanisms in the organization which is analyzed. Lastly, The TIME support mechanism forms the model frame where relationships of work, workplace and worker are identified to understand whether shared commitments or vision are aligned to support the performance (Main, 2000).

Campbell's Taxonomy of individual performance lies at the root of the industrial psychology (Swanson & Horton, 2001). According to the Campbell's model, performance as a dependent variable should be given more attention according to which components, determinants and predictors (declarative knowledge, procedural skills and knowledge and motivation) of performance are the key parts. This is the best description of the individual performance (Swanson & Horton, 2001). Unlike Gilbert's BEM, Campbell's model concentrates only on the individual factors rather than the work environment (Swanson & Horton, 2001).

2.5.3. Related Research

In the literature, a number of researchers have investigated the relationship between different performance dimensions and different performance outcomes. In those researches, organizational performance is investigated with different levels and components. Although only financial performance has been linked traditionally with organizational performance, operational and organizational effectiveness, organizational resources, knowledge management and capabilities are considered as key variables of the organizational performance (Liao & Wu, 2009).

Seleim and Khalil (2007) offer a conceptual model representing the knowledge management processes (knowledge acquisition, knowledge documentation, knowledge transfer, knowledge creation, and knowledge application) on organizational performance. The model is tested using survey data from software developers (n=38) working at the Egyptian software firms. The results confirmed that only knowledge application influences directly the organizational performance. In other words, organizational performance might be improved as long as knowledge is applied to the job tasks.

Similarly, Supyuenyong and Swierczek (2011) investigate the relationship between knowledge management processes and organizational performance of small and medium enterprises. Their framework is tested with survey and interview data obtained from 81 employees and service providers to explain organizational performance consisting of product performance, process performance, customer satisfaction, reputation and cost reduction with four knowledge management processes (knowledge acquisition and creation, knowledge organization and retention, knowledge dissemination, and knowledge utilization). The results indicate that knowledge organization, retention and knowledge utilization improve organizational performance.

Liao and Wu (2009) conduct a research with 327 participants from Taiwanese companies to understand the relationship between organizational performance with knowledge management and organizational learning. According to the survey results, organizational performance is positively related with knowledge management and organizational learning.

In some researches, researchers' performance and cause analyses are limited to reveal only performance factors or barriers. In these studies, they do not offer any possible intervention package based on the analyses. For example, Ripley (2003) conducted a survey research on assembly line employees (n=273) from a manufactory that produces airbags for automobile factories to develop an instrument and model for assessing participants' perception of work environment variables. The instrument (the performance Environment Perception Scale or PEPS) was developed with sixty scale items representing work environment problems. The data gathered with the instrument and perceptual factor model was developed based on the factor analysis. According to the results, a five-factor solution was provided and named as communication and participation (Data), organization and design of work (Instruments), characteristics of the work setting (Instruments), personal fit of employees, the work and the work setting (Capacity) and personal fit of the work group, the work, and the work setting (Capacity).

In the non-experimental, quantitative survey study of Crossman (2010), the impact of contextual environment variables on firefighters' (n=341) safety motivation were evaluated. Using Gilbert's BEM, the results indicated that communication, resource availability and incentives as contextual factors have a significant effect on safety motivation. Indeed, they concluded that incentives had a direct effect on safety motivation besides taking in communication and resource availability.

In another study, Lion (2011) conducted a quantitative research on chief academic affair officers (n=98) from baccalaureate- (and higher-) degree granting institutions in the United States to understand both the relationship between offering online courses and some form of faculty the instructional support and the relationship between availability of support services and the use and adoption of the Gilbert's BEM. The first section's results showed that there is a significant relationship between two variables, indicating instructional support for the faculty teaching is offered when institutions offer web-based learning. As for the second purpose, the researcher conducted an exploratory factor analysis and seven new variables were obtained. All variables were renamed based on the categories of the BEM, environmental data, environmental tools, environmental incentives, personal knowledge, personal capacity, personal motives and the entire BEM. Then, a correlational analysis was performed to test all seven new variables. Results showed that four out of the seven variables, three environmental variables and one new variable, entire BEM, were used for better conceptualization of instructional support provided by institutions. More specifically, in the area of environmental data, there is a strong relationship between all the variables and the dependent support variable while the variables representing repertory of behavior factor in BEM do not demonstrate any relationship between instructional support and all other variables. To summarize, the researcher stated that instructional support provided by institutions and using the principles of BEM is significant.

In an exploratory study, Cox, et al. (2006) utilized the Gilbert's BEM to measure MBA candidates' from the University of Dallas perceptions of the efficacy of the six levels regarding different performance improvement approaches which help them to improve performance for their organizations. The survey, achieving productive performance, administered to participants (n=119) to understand the perceived value among the six components of the BEM. Their results indicated that environmental support levels, supplying direction and feedback, tools, equipment, procedures and incentives were more valuable than strategies of knowledge, capacity, and motives in terms of improving performance. Moreover, no significant differences between gender, age, industry and job types and achieving productive performance scores were found; however, the research findings indicated significant differences between race and years of management experience and performance scores. To sum, more experienced participants (20+ years) valued motives significantly more than inexperienced respondents (5 to 14 years of experience). Moreover, according to researchers' assertions, further researches should be conducted to try to understand why certain ethnic groups have valued some levels of the model (giving direction, and feedback, capacity and knowledge) better than others.

Lundberg, Elderman, Ferrell, and Harper (2010) conducted a front-end analysis and recommended interventions on Best Tool's retailer based organization director of parts and service. The analysis phase was based on Harless' 13 smart questions and Gilbert's BEM. Various data-gathering and analysis methods, document and artifact reviews, open-ended interviews (n=4), semi-structured interviews (n=3), observations and surveys (n=84) were used to understand how to improve the service center technicians' weekly average. Interconnected causes were grouped under six factors, management, technicians, methods, time, machines and materials. Updating job descriptions and performance reviews and identifying training needs were recommended as solutions for these performance issues.

Using the framework of Gilbert's BEM and following the HPT model, Duman et al. (2011) conducted a performance and cause analysis, and offered interventions to reveal performance deficits and improve the performance of the radiology department of the ATA hospital located in the Intermountain West of the United States. Data were collected through semi-structured interviews, observations and historical data reviews. According to the results, the main performance issues were found in four different categories, data, instruments, incentives and knowledge. In the light of these, three solutions, job aids, standardized order forms, and electronic reference utility were offered.

Different from the studies mentioned above, some researchers recommend interventions based on the analysis they conduct. Indeed, some take a further step to evaluate the offered solutions. To illustrate, using the traditional HPT model, Bobbert, Robinson, and Martin (2012) conducted a research on a campus television channel broadcast from a southeastern American university cable system (CHWK) to identify performance problems and offered a solution. The data was collected through environmental analysis, interviews and surveys. Having conducted performance analysis and cause analysis, the main causes of performance drivers that lead to low quality and low performing system were identified. The main performance issues were grouped under three drivers, production, delivery and people and subcategories were also identified. Computerization of the current system via installing new hardware and processing methods were recommended by researchers as a gap closure strategy.

Austin et al. (2001) carried out an experimental research on the customer service department of an insurance agency (n=8) to determine performance obstacles of the participants and to offer an intervention package. Using Gilbert's BEM, researchers identified performance deficiencies at environmental and repertory of behavior levels. The lack of effective prompts for performance and consequences at environmental support and lack of knowledge of the policies and consequences at personal level could be the reasons of performance issues. The intervention package consisted of task clarification, self-monitoring and public posting of group performance were utilized and the initial results showed that participants performed more than 50% better than the average performance limits for all targeted sections.

In summary, the existing literature represents and supports the claim asserted by Gilbert (2007) that the environmental component of the BEM holds the real and greater leverage than repertory of behavior component when investigating the performance problems of the organizations.

2.6. Selection, Design, Development and Implementation of Intervention

Organizational needs for improving performance and capacity are instrumental in selecting, designing, developing, and implementation of appropriate interventions (Pershing, 2006a). Indeed, Rothwell (1996, 2005) defines this process as a strategy because strategy as a term entails a long-term plan for change.

The term intervention was coined by Barry Booth and Odin Westgaard in 1979 (Hale, 2007). Intervention is a performance initiative aiming at improving the organization's efficiency and effectiveness (Miles, 2003). Van Tiem et al. (2001) define interventions as improvement activities which are used for fixing and depletion of problems emerged in the workplace. According to Stolovitch and Keeps' (1998) view, intervention is a solution or a solution component determined for closing the performance gaps.

From Van Tiem et al. (2001) perspective, intervention is planned assessments which are designed and developed so as to relieve and sort out performance problems. That is why interventions have an effect on the job performance. Namely, specific needs that point out gaps between current and future situations for an organization may be fulfilled with designing and developing interventions (Pershing, 2006a). The solution should be both technically and theoretically correct and capable of solving the performance problems (Brinkerhoff, 2006). Therefore, the overall solution package should come out of the determined causes (Burner, 2010). These solutions should be associated with the contributing factors determined in the performance analysis process (Watkins, 2007d). In other words, offered solutions should emerge from the facts disclosed in the analysis process (Burner, 2010). Pershing (2006a) suggests that performance improvement interventions should resolve all performance problems of the organizations to be considered as an effective method. The ultimate goals of the intervention may not be limited to the organizational perspectives only. As Mulder (1999) promotes the idea that they can be directed to change social systems and processes via solving complex problems.

As a result of the improvements in performance, interventions lead to changes to individuals, groups, or organizations. Many factors such as organizational, environmental and people affect performance. Hence, a vast number of interventions might be used for solving performance problems (Van Tiem et al., 2001).

Van Tiem et al. (2001) underscore the successfulness of interventions. First and foremost, an intervention should be cost effective for the organization. Secondly, sustainability of the identified intervention should be easily maintained. Lastly, accountability as a maintenance is to be guaranteed. Moreover, Daniels and Esque (2006) suggest that HPT interventions may support organizations in performance related issues. That is why interventions should cover all organizations' needs such as vital processes, functions and procedures (Pershing, 2006a). Generally, Pipe states that well-designed technical systems are installed with the aim of reducing employees' weariness, improving safety, decreasing physical disturbance and increasing quality and quantity of outputs (as cited in Pershing, 2006a). In Swanson's (2007) view, any performance improvement efforts should simply answer performance question of whether the individual, process, work team and organization will perform better after implementation of the intervention.

2.6.1. Selection

Literature on performance analysis shows that selection of the justifiable performance solutions depend on analyses results. Findings from analyses might help practitioners make appropriate and useful performance improvement decisions (Watkins, 2007c). As Svenson (2006) defined this process as "deriving requirements", intervention selection categories and also analysis data play a pivotal role in this stage. Especially, performance analysis is important for deciding on the types and number of interventions (Watkins, 2007b). Having identified the performance gaps with the performance analyses, interventions should be designed for either balancing the performance levels or closing all performance gaps (Desautels, 2006). After performance and cause analysis phases, some interventions could be recommended by HPT practitioners.

In HPT, there are many classifications of interventions to be selected and used for any performance improvement initiatives (Van Tiem et al., 2004). Van Tiem et al. (2001, 2004) divide the intervention selection process into three phases: preliminary, survey and selection so as to handle procedures to be more manageable for practitioners. For this purpose, they develop a performance intervention tool based on most common interventions and classify these by relationships among each intervention. Their classification consists of eight possible categories: performance support systems, job analysis/work design, personal development, human resource development, organizational communication, organizational design and development, financial systems, and other (Van Tiem et al., 2001).

Without giving any links with causes of performance, Stolovitch and Keeps (1998) divide interventions into two categories, learning and non-learning. According to their categorization, learning interventions are appropriate and should be used when there is a lack of skills and knowledge in the organization. To help performers acquire skills and knowledge, on-the-job training, simulation, role play, natural experience, laboratory training and classroom training are examples of learning intervention (Stolovitch & Keeps, 1998). As for non-training interventions, they can be classified as job aids, environmental and incentive, consequences and motivation (Stolovitch & Keeps, 1998).

Watkins (2007b; 2007d) offers a framework called the Performance Pyramid for organizations. Watkins' (2007b) framework is based on the idea that each or cluster of performance factors should be associated with related performance technologies given in the system (Table 2.2) as a set of performance solution packages. The subject framework provides a direct link between the relationships and solutions (Watkins, 2007d). Watkins (2007b) goes beyond the idea that each performance technology should be connected with the results of the performance and cause analyses before the design and development stages.

Table 2. 2

The Performance Pyramid with Associated Performance Technologies (Watkins, 2007b, p.13)

Building blocks of Performance	Associated Performance Technologies
Strategic Direction (including vision for community and society, organizational mission objective, and individual and team objectives)	Strategic planning, needs assessments, balanced scorecards, communication opportunities
Expectations & Feedback	Communication opportunities, performance reviews, balanced scorecards, participation in strategic planning
Tools, Environment & Processes	Computer systems, workplace redesign, process engineering, ergonomics review, communications
Rewards, Recognitions & Incentives	Awards program, communications, monetary incentives, balanced scorecards
Motivation & Self-Concept	Mentoring, career counseling, motivation workshops, team-building programs, performance appraisals
Performance Capacity	Recruitment programs, retention programs, resources allocations, workforce planning, new computer technologies
Skills & Knowledge	Job aids, classroom training, e-learning, mentoring, just-in-time training, after-work educational opportunities, knowledge management

Using the framework of Gilbert's BEM classification, Rosenberg (1990) offers a general schema that all possible interventions fall under any BEM levels (Table 2.3).

Table 2. 3

Performance System Factors (Rosenberg, 1990, p.47)

Factor	Examples
Data	Performance criteria/feedback, job documentation/job aids
Resources and Tools	People, money, equipment, time Organizational, job, ergonomic efficiencies
Skills and Knowledge	Training and education
Consequences, Incentives and Rewards	Compensation, New opportunities Career planning/development

Table 2.3 *Continued*

Capacities	Personnel selection Succession planning
Motives and Expectations	Quality orientation Empowerment, leadership

Rossett (2009) offers a general solution framework for each kind of performance drivers. According to the framework (Table 2.4), four performance drivers, skills, knowledge and information, motivation, environment and incentives, are associated with probable solutions.

Table 2. 4

Summary of Drivers and Solutions (Rossett, 2009, p.64)

Performance Drivers	**Primarily Probable Solutions**
Lack of skills, knowledge, information	training, job aid, education, documentation, performance support tools, knowledge bases, communication initiatives, clear and updated expectations
Lack of motivation	training, and education, participatory goal setting, job aids, documentation, performance support tools, knowledge bases, communication initiatives, selection of individuals who want to do it
Lack of environment, tools, processes	new or improved tools, job design, job enrichment, workplace design, reengineered processes
Lack of incentives	new policies, revised performance management system, management development initiatives

To summarize, Burner (2010) offers a general schema that represents both descriptions of situations related to performance shortfalls and proposed solutions (Table 2.5). In his framework, probable solutions might be training, job aid and education if the obstacles are related with the performers' lack of skills, knowledge and information.

Table 2. 5

Description of Situations and Solutions (Burner, 2010, p.164)

If the performers…	**Use the following solution…**
Do not know it, cannot do it	Training
Can do it but need support	Job aid
Cannot anticipate it	Education

In consequence of a multi-dimensional nature of the performance problems, quality-improvement initiatives and business opportunities, one intervention might not be sufficient for filling the gaps (Jang, 2008; Pershing, 2006a; Van Tiem, 2004). Rather, the performance gaps which result from mainly multiple and interacting sources may be closed by implementing multiple interventions and performance technologies (Stone & Endicott, 2000; Watkins, 2007b, 2007c, 2007d). As Van Tiem (2004) indicates that multiple interventions should be the best strategy even though there is only one performance cause. Therefore, blended solutions may be also be phased in selecting needed interventions. As long as selected interventions produce intended results for the organizations, no matter which performance technologies and interventions are combined or blended (Watkins, 2007b).

2.6.2. Design and Development

As Pershing (2006a) indicates, designing performance improvement interventions comprises detailed plans and decisions appearing after some phases, such as performance and cause analyses, specifying characteristics of interventions, and detailing evaluation plans. In contrast, developing process requires practitioners to convert the design specifications into factual interventions and strategies for the desired implementation. More specifically, design and development processes vary in terms of selected interventions' attributes (Watkins, 2007d). In sum, the designers can reach a conclusion about what primary probable solutions would the best to fit the performers for doing their job well related with the standards and objectives determined in the analysis phase (Molenda & Pershing, 2004).

2.7.Intervention Implementation and Change

Intervention implementation and change is the fourth phase of the HPT model. This is the phase during which actual usage of the selected interventions is clearly elucidated in the organization. This process might occur gradually through the planned change. Van Tiem et al. (2001) propose some guidelines to diminish resistance to new interventions. Firstly, the advantages of the interventions for users should be highlighted. Secondly, changes and new ideas should be presented as valuable and achievable. Thirdly, compatibility of the interventions with current situations should be highlighted. Fourthly, adaptability of the new ideas through the organization without loss of functioning should be sustained. Lastly, impact of these changes and new ideas should be identified for the key people and groups, as well as for the users in the organization. Pershing (2006a) views the implementation stage as an application of the selected interventions on a wide range of organizations.

2.8. Evaluation

The existing body of research shows that two important concepts are important and play a pivotal role in the definition of the evaluation: judgment and value. As Hale (2007) defines that evaluation is the activity in judging something or giving value to it. From Rossett's (2006) view, evaluation is composed of judging approaches. Chyung (2008) defines evaluation as a making a value judgment of the evaluation phenomenon. The key question to be answered in evaluation process is how well we have done it (Rossett, 2006). On the other hand, the core element of the evaluation is valuing (Spitzer, 2007). It refers to any initiative maximizing the merit, or to the importance or usefulness of the individual or organization (Dessinger & Moseley, 2004). Rothwell (1996, 2005) defines evaluation as the process of identifying value. Simply put, judgment can be seen as an outcome while the value is the process of the evaluation (Spitzer, 2007).

From HPT perspectives, same different views on evaluation can be seen from literature. The major object of the evaluation in HPT is to understand the functions of the implemented intervention designed and developed for improving human performance

(Binder, 1995). Evaluating any performance improvement intervention entails placing value on results (Rothwell, 1996, 2005). According to Brinkerhoff (2006), effective evaluation should be systematic, fair, sensitive and accurate. As for Rossett's (2006) view, evaluation is an effort to review the current endeavor for understanding what has happened in the organization. In other words, evaluation is the examination of the past situations as to continue and plan for future (Rossett, 2006).

In Van Tiem et al. (2001, 2004) view, the evaluation as a final phase of HPT model is conducted in order to produce important information about accomplishment of the intervention(s). The first outcome of the evaluation phase would be of considerable assistance for evaluation of the results of selected intervention(s) to the organization. Secondly, the evaluation phase would simplify the decision with respect to performance, the performer or the whole organization. The main aim of the evaluation in HPT is to enhance the effectiveness of HPT efforts via improving organizational and individual performance (Brinkerhoff, 2006). To achieve this, the main understanding of the evaluation should address questions that are related with performance concept such as whether the performance problems are solved, what changes can be observed, whether the solution opportunity is realized or whether the solution effort matters regarding organizational strategy (Jang, 2008). As Pershing (2006a) suggests that reliable and valid evaluation data which is developed and implemented for understanding what worked and how it worked may add knowledge to the HPT field and advance for future practice.

Brinkerhoff (2006) defines evaluation as a formalized and systematic reflection. It is a reflection because the main object of the evaluation is to review what has been done and how in any initiatives. It guides practitioners through whether the improvement has been accomplished as intended or not. In other words, evaluation takes a big picture showing the right and false steps followed through all phases. Moreover, it is a systematic process because it is a planned activity and resources and efforts are assigned to be done well (Brinkerhoff, 2006). Owing to the fact that it involves conducting scientific research and following some other guidelines by researchers, it may be considered as a formal reflection (Brinkerhoff, 2006).

Direct and standard measurement of the results is a prerequisite for conducting objective evaluation of any intervention (Binder, 1995). Evaluation provides extensive information for practitioners, stakeholders, managers, and other clients to understand how, when, and why HPT works for organizations (Brinkerhoff, 2006). The evaluation data can be used (a) as a feedback to assess an initiative in accordance with objectives, and strategies of the plan for sustaining accountability (Binder, 1995; Enos, 2007; Pershing, 2006a), (b) a control for the value of the program (Pershing, 2006a), (c) a power to be used for political decisions as a decision-making option (Binder; 1995; Enos, 2007; Pershing, 2006a), (d) an intervention to determine effects upon working environments (Enos, 2007; Pershing, 2006a) and (e) as a research for the contribution of the HPT field to prove the validation of the method used (Binder, 1995; Pershing, 2006a).

Evaluation might be conducted with multiple sources such as best practices, customers, supervisors, experts, work products, and so on (Rossett, 2006). Pershing (2006a) suggests that tangible and measurable results must be obtained from the implementation of interventions. Moreover, the organization where a performance improvement initiative is implemented must be effected in a positive manner. Indeed, results must have a positive impact on members, customers or other related organizations. Brinkerhoff (2006) asserts that in case the evaluation is conducted with the right people at the right time, any performance improvement endeavor might produce desired and positive results to be used for decisions. Pershing (2006a) underscores that effective performance improvement yields desired results for an organization. He continues further that it should be linked with achievement of purpose by aligning with the mission, goals, and objectives of the organization and effective and efficient results. Successful evaluation data should give information about to what extend the solution closes the identified performance gaps, associates to the organizations' prerequisites, and adds value and knowledge to the concerned people (Addison & Haig, 2006). When multiple solutions are implemented, the measurement of the interventions should address the results obtained by the total combination of the solution packs regarding the variation in workgroup performance and organizational results (Robinson & Robinson, 2006).

Pershing (2006a) classifies evaluation stages in two types: formative and summative evaluation. While the former is implemented for enhancing quality of designed and developed interventions, the latter focuses on the determination of how the completed and implemented initiative works well for an organization. Conversely, Van Tiem et al. (2001, 2004) express that evaluation methods are of four types.

- Formative Evaluation

The term formative evaluation was coined by Michael Scriven in 1967 (Molenda, 2010). Formative evaluation requires diagnostic and developmental processes through ongoing events and phases in HPT process with the aim of improving performance intervention package to make any corrections (Addison & Haig, 2006; Dessinger & Moseley, 2006; Hale 2007; Van Tiem et al., 2001, 2004). It can be applied during performance analysis, cause analysis, and selection or design of interventions (Dessinger & Moseley, 2006; Lee & Owens, 2004). It enables practitioners to verify information about the successfulness of the interventions' deliverables (Watkins, 2007c).

- Summative Evaluation

Summative evaluation centers around determining the effectiveness of whole processes in the HPT model and the intervention(s) selected and implemented (Van Tiem et al., 2001). Brinkerhoff (2006) defines the summative evaluation as an assessment of the past efforts regarding the worthiness of these performance improvement efforts. The aim of the summative evaluation is to identify immediate competence of performers and effectiveness of the intervention(s). It could be applied during implementation and change management phase. It can be also conducted immediately after implementation of the interventions (Dessinger & Moseley, 2004). It can also be considered as the most objective method to obtain data about the effectiveness of the selected performance intervention solutions (Van Tiem et al., 2004).

Summative evaluation is conducted for assessing reaction, accomplishment, results, learning and capability, and immediate impact of the performance improvement interventions (Dessinger & Moseley, 2006; Van Tiem et al., 2004). Indeed, immediate intervention outcomes might be focused on for the HPT process. As Addison and Haig (2006) state summative evaluation can also be conducted after limited implementation of the selected interventions.

- Confirmative Evaluation

Twenty eight years ago, the term confirmative evaluation was coined by Misanchuk (Van Tiem et al., 2004). Confirmative evaluation focuses on enduring and long-term effects of the intervention package. It is different from summative evaluation in that it centers on continuing competences of performers and effectiveness of the interventions. It can be used by HPT practitioners 6-12 months after implementation. Moreover, long-term impact of the interventions can be evaluated regarding efficiency, effectiveness and value (Dessinger & Moseley, 2006). The major purpose of the confirmative evaluation is to understand and make an inference about the continuous quality control of the implemented interventions (Van Tiem et al., 2004).

- Meta Evaluation

Meta evaluation revolves around each phase of the evaluation process for validity, reliability, and accountability of all efforts (Dessinger & Moseley, 2006; Van Tiem et al., 2001, 2004). It might be used with the object of evaluating formative, summative, and confirmative processes to offer some perception to the evaluator. It can be applied after confirmative evaluation.

2.8.1. Kirkpatrick's Four Levels of Evaluation Model

The four-level model of evaluation allows researchers to evaluate the effectiveness of training programs using systematic and systemic approaches (Kirkpatrick, 1994). Donald Kirkpatrick's dissertation centers on evaluating a supervisory training program (Chyung, 2008). In the light of his research, the four-level model of evaluation was published in 1959 in four articles (Dick & Johnson, 2007). He replaced the term steps with levels appeared later in the model (Dick & Johnson, 2007; Humphress & Berge, 2006). The levels are (1) reaction, (2) learning, (3) behavior, and (4) results (Kirkpatrick, 1994). Each level of the evaluation model provides different information on the effectiveness of the training program (Chyung, 2008).

2.8.1.1. Level 1: Reaction

The level 1 evaluation is carried on at the end of training to gather information about participants' immediate reactions to the program (Kirkpatrick, 1994, 2000). Kirkpatrick (1994, 2000) terms this process as a measurement of customer satisfaction. The main aim for this level is to obtain a positive reaction of the participants because the utilization of the program's future is relied on the positive reactions, not the negative ones (Kirkpatrick, 1994, 2000). The data is gathered from the participants not only for getting a single overall reaction but also for obtaining attitudes to the multiple and specific components or topics of the program (Dick & Johnson, 2007). It provides easy, fast and economical ways to understand how participants react to the training programs (Rothwell, 1996, 2005).

Kirkpatrick (1994, 2000) classifies the importance of measuring reaction into four reasons. Firstly, this type of measurement provides valuable feedback regarding the training program and its future applications. The second reason is that it gives trainees a chance to help trainers do their job well. Thirdly, quantitative data can be gathered via reaction sheets to be presented to the managers and other stakeholders. Lastly, standards of performance can be created with quantitative information for future programs (Kirkpatrick, 1994).

2.8.1.2. Level 2: Learning

The learning level can be explained as the change in participants' attitudes, knowledge and/or skills at the end of the program (Kirkpatrick, 1994). It is important to answer the questions such as, which skills are developed or improved, what attitudes are changed and what knowledge is learned after the training programs because it is asserted that no change in behavior will occur, without learning (Kirkpatrick, 1994, 2000). Therefore, the level 2 evaluation should be directed towards specific learning objectives and the material covered in the training event or program to obtain a valid and reliable measurement of learning (Dick & Johnson, 2007).

The measurement of learning is important for two reasons (Kirkpatrick, 1994). The first reason is that results of the evaluation show the effectiveness of the instructor. Moreover, it also allows instructors to obtain specific information about the learning via analyzing the change in answers to each item asked in the tool.

2.8.1.3. Level 3: Behavior

The level 3 attempts to evaluate the changes in job behavior resulting from the attendance of the training program (Kirkpatrick, 1994). In some cases, participants may not use knowledge or skills learned from the learning event in the real-job setting- even if learning occurs (Dick & Johnson, 2007). Hence, the behavior level can be clarified as the change in behavior which has occurred as a result of the attendance in the program (Kirkpatrick, 1994, 2000).

As Kirkpatrick (1994, 2000) states the measurement of the level 3 is more difficult than the previous levels because of three reasons. The first reason is that it is difficult to create an opportunity where trainees can show the change in their behaviors. Secondly, it is not so easy to make a prediction about when a change in behavior will take place. Lastly, intrinsic and extrinsic rewards may have more control over the change in behavior (Kirkpatrick, 1994). To sum, many other variables as well as training affect mainly individuals' behaviors on their job settings (Rothwell, 1996). Taking these difficulties into account, it is possible to assert that demonstrating a correlation between the job behavior change and training has been one of the major problems of the model (Rothwell, 1996, 2005).

2.8.1.4. Level 4: Results

The results level is carried on obtaining the final results of the program (Kirkpatrick, 1994). However, determining final results of the training program is the most difficult phase of the Kirkpatrick's model (Kirkpatrick, 1994; Kirkpatrick & Kirkpatrick, 2006; Rothwell, 1996, 2005). Requiring too much time and cost for the design and development of the evaluation process is the main challenge of the level 4 (Dick & Johnson, 2007; Miles, 2003; Rothwell, 1996, 2005). In general, bottom-line results consequences of training are measured in level 4 (Miles, 2003). These do not need to be only financial results like return of investment (Dick & Johnson, 2007).

2.8.2. Kirkpatrick's Four Levels and Non-Instructional Performance Improvement Interventions

Although Kirkpatrick's model has started to become very popular in the companies during the 1970s, it still maintains its popularity in not only in business and industry but also in the HPT field (Dick & Johnson, 2007). Moving into the HPT field, Kirkpatrick's four levels can be applied in evaluating most of the performance improvement interventions; in other words, its area of utilization is not limited to training programs (Pearlstein, 2010). Kirkpatrick's four levels of evaluation are compatible with the major concepts of HPT (Dick & Johnson, 2007; Pearlstein, 2010). In general, the model provides an easy and useful framework to understand evaluation and its processes in general (Rothwell, 1996, 2005).

Kirkpatrick's model can be used for the evaluation of the solutions to determine organizations' performance obstacles with some minor modifications (Dick & Johnson, 2007; Rothwell, 1996, 2005). Whether an intervention package focuses on instructional or non-instructional characteristics and elements, the evaluation framework can be applied to evaluate selected intervention respecting reaction, immediate or on-the-job impact, benefits and successfulness (Pearlstein, 2010).

As Marker, Huglin, and Johnsen (2006) claim that the general consensus on defining levels of evaluation for non-instructional interventions has not been reached in the HPT field. Using the frameworks of Kirkpatrick and Kaufman, they define levels of evaluation for non-instructional interventions (Table 2.6). In the proposed framework, the names and descriptions of levels are the same except that implementation as a level is used instead of learning. Because Kirkpatrick's levels cannot be adapted directly to non-instructional interventions as Marker et al. (2006) proposed, successfulness of the selected intervention's components can be evaluated in the second level rather than attainment of skills, knowledge or competence.

Table 2. 6

Evaluation levels for instructional and non-instructional interventions (Marker et al., 2006, p.16)

Evaluation Levels	Representation of levels for instructional interventions	Representation of levels for non-instructional interventions
1	Reaction – attitudes toward the intervention	Reaction – attitudes toward the intervention
2	Learning - Attainment of skills, knowledge & competence	Implementation – Successful implementation of the intervention components as planned
3	Behavior - Job performance, application, transfer	Behavior - Job performance, application, transfer
4	Results - Impact of the intervention on the organization	Results - Impact of the intervention on the organization
5	Societal Benefit - Impact of the intervention on Society	Societal Benefit - Impact of the intervention on Society

2.8.3. Extension of Kirkpatrick's Model: Kaufman's Level 5

Roger Kaufman tackles mega planning about societal perspectives in his theories (Burner, 2010). Kaufman (2006) recommends that the societal value-added frame for organizational success should be defined in all practices of HPT and also be one of the basic essentials for the field because all people and organizations are means to societal ends. Therefore, this perspective is based on the idea that any job and organization is the vehicle which puts a high value on external clients and society via doing, producing, using and delivering outputs or products (Kaufman & Lopez, 2008). According to his position, this societal frame is labeled as the mega level of planning. Moreover, his organizational elements model takes form with the idea of mega planning (Burner, 2010; Kaufman & Lopez, 2008).

According to Kaufman's organizational elements model, there are two classes of organizational results (Chyung, 2008). While the micro-level results are the accomplishments that performers produce, the macro-level results are the attainment of the organizations as a whole. Besides these results, there are also other types of results commonly known as mega-level results that are the outcomes produced beyond the organization (Chyung, 2008; Talaq & Ahmed, 2004).

As Van Tiem et al. (2001) suggest that organizations should contribute to the community and also they should deliberate on environmental and societal impact. Kaufman (2000) challenges practitioners to consider for associating HPT enterprises with external client and societal value added. Indeed, he adds that having success in HPT interventions depends on adjusting to the external and internal elements. Therefore, every organization should answer the question of what is the societal problem addressed in case of finding solutions for any issue (Kaufman, 2006). He argues further that all organizations add value to external clients and society and this strategic thinking and planning should be applied to all initiatives. That is to say, any evaluation effort conducted in the organization should focus on benefits and outcomes at a level involving society higher than the level of the whole organization (Pearlstein, 2010). Because the entire society, not only the organization itself, is viewed as a whole system by Kaufman and his associates any efforts should add value to the both the society and the organization (Chyung, 2008).

To summarize, it can be seen that great emphasis on the societal value has been put in HPT field by variety of researchers. Identifying the limitation of Kirkpatrick's model, Kaufman and Keller (1994) recommend joining a different level to Kirkpatrick's four levels of evaluation model to direct societal impact of the interventions. Moreover, Hamblin's five level evaluation framework and Roger Kaufman's extensive writings about the importance of the societal value are the efforts drawn an attention in the field (Schaffer & Schmidt, 2006). Although Kaufman's additional level is considered as a level 5, the other constructs and approaches such as the ROI (return of investments) are also termed for this level. Some researchers assert that additional levels are also a component of level 4 (Miles, 2003). Whatever the label used or integrated Kirkpatrick's four levels of evaluation model and one of the expanded frameworks such as Kaufman's framework may be used as a fundamental tool for organizations to adjust any evaluation efforts (Watkins, Leigh, Foshay, & Kaufman, 1998).

2.8.4. Current Evaluation Models in HPT Literature

Evaluation models in HPT have been originated in educational technology and instructional systems development fields (Dessinger & Moseley, 2006). It is possible to assert that there is a tendency for the evaluation studies in HPT field. The researches including series of levels for an inquiry and investigating how the intervention effects upon the individuals and the organization in order are the most cited approach in the field (Bichelmeyer & Horvitz, 2006).

As Dick and Johnson (2007) express that numerous evaluation models were developed in the 1970s. They argue further that the CIPP evaluation model (context, input, process, and product) developed by Daniel L. Stufflebeam is the most influential model of this period. While context evaluation equaling to a needs assessment covers requirements regarding needs and objectives of the program, input evaluation includes the assessment of the resources which will be utilized throughout the program (Dick & Johnson, 2007). Process evaluation is typically called a formative evaluation, and it is used to determine the initial efficiency and required revisions of the program; however, the last phase of the model, product evaluation, equals to summative evaluation in that success of the program regarding whether the desired results are obtained, or not is measured (Dick & Johnson, 2007).

According to Dessinger and Moseley (2006), the evaluation models developed to assess both training and non-training performance improvement interventions, to illustrate, the CIRO Model, Hierarchy Model, Bell System Model, Contingency Model, Behavioral Science Model, Xerox Model, IBM Evaluation Model, and Saratoga Institute Model have been derived from Kirkpatrick's four levels of evaluation model. Besides, Dessinger and Moseley (2006) approach the evaluation process in a different way that the evaluation phase should take part in all stages of HPT effort, rather than being conducted as a separate stage at the end of the HPT model. In their Dessinger-Moseley Full-Scope Evaluation Model, as a more recent iteration of Kirkpatrick's model, formative, summative, confirmative, and meta evaluation phases are blended so that evaluation as a holistic view can be applied to the HPT process (Dessinger & Moseley, 2006).

Evaluation models might be classified into some categories. Dessinger and Moseley (2006) group the evaluation models, mentioned before, as curriculum, training and eclectic models. While curriculum evaluation models deal with program activities, training models have been used to assess both training and non-training performance improvement interventions. Eclectic models are more flexible in their approach to evaluation (Dessinger & Moseley, 2006).

Moreover, Dessinger and Moseley (2006) approach the evaluation process in a different way that the evaluation phase should take part in all stages of HPT effort, rather than being conducted a separate stage at the end of the HPT model. In their Dessinger-Moseley Full-Scope Evaluation Model, as a more recent iteration of Kirkpatrick's model, formative, summative, confirmative, and meta-evaluation phases are blended so that evaluation as a holistic view can be applied to HPT process (Dessinger & Moseley, 2006). Similarly, evaluation is regarded as a cycle in a Six-stage Model by Brinkerhoff and consisting of six main steps, needs and goals, design, operation, learning, usage and endurance, and payoff (Van Tiem, Moseley, & Dessinger, 2004).

2.9. Performance Support Systems

The object of performance support systems (PSS) is to allow systematic movements for individuals in order that performers might be supplied with what they need, when they need it, and in the form in which they need it to do their job well with regard to organizational objectives (Van Tiem et al., 2001; Williams, 2000). As Williams (2000) asserts that it is really difficult to define the PSS owing to the complexity of the systems built on it. To illustrate, any PSS may consist of only text-based documentations or manuals, or any support tools delivered via computers.

The main aim of the performance support for organizations is to guide and improve performance directly so that people in the organization can execute a level of performance which cannot be achieved without any support (Rosenberg, 2006). That is to say, the ultimate goal of using the PSS tools in organizations for performance support and improvement is to attain errorless performance (Williams, 2000). The use of performance support is based on the premise that human performance covering all features of the physical and cognitive processes can be enhanced with the proper designed performance interventions (Barker, Van Schaik, & Famakinwa, 2007). That is why a performance support should cover all the tasks, procedures, activities and resources related to the whole learning process (Gery, 1991). Moreover, PSS encompass the tools that are designed and developed for the users to provide them with the knowledge and skills required while completing the tasks on the job (Williams, 2000). In doing so, performance support helps performers to reach directly the assistance in the performance of a task or job (Rosenberg, 2006). This sustains using the support in challenging issues on the job so as to eliminate rework while demonstrating the correct behavior at first (Williams, 2000).

Van Tiem et al. (2001, 2004) classify PSS as instructional and non-instructional according to their potentials, addressing individual and organization needs that they comprise (Table 2.7).

Table 2. 7

Performance Support Systems (Van Tiem et al., 2004, p. 27)

Instructional Performance Support Systems	**Non-Instructional Performance Support Systems**
Knowledge Management	Job Aids
Learning Organization	Electronic Performance Support Systems (EPSS)
Action Learning	Documentation and Standards
Education and Training	
• Self-Directed Learning	
• Technical and Non-Technical Training	
• Training	
• Just-in time Training	
On-the-Job training	
Interactive Learning Technologies	
• Enterprise Training	
• Classroom Learning	
• Distance/Distributed Learning	
• Computer-Based Learning	
Online/e-learning	
Games and Simulations	

2.9.1. Instructional Performance Support Systems

An instructional PSS intervention might be decided as right for an organization where there is a gap exists between job specifications with current knowledge and the skill or attitude of performers (Van Tiem et al., 2001, 2004). Instructional PSS which links workplace learning to performance is classified by Van Tiem et al. (2001, 2004) as knowledge management, learning organization, action learning, education and training, interactive learning technologies, and games and simulations (Table 2.7).

2.9.2. Non-Instructional Performance Support Systems

There are not vague differences between instructional and non-instructional PSS (Van Tiem et al., 2001). Designed support in non-instructional PSS incorporates instruction because non-instructional PSS encompasses problem solving and decision making attributes which entail a learning experience (Van Tiem et al., 2001). In general terms, non-instructional PSS is selected and implemented for improving processes, products and services and managing organizations' plans, materials, results and success evaluations (Van Tiem et al., 2004).

Just-in time and just-enough information are afforded to performers for the purpose of performing tasks well via non-instructional PSS. They might be paper-based, computer-based, or video-based. Van Tiem et al. (2001) categorize non-instructional PSS into three groups, job aids, electronic performance support systems (EPSS), and documentation and standards (Table 2.7).

Regardless of the delivered strategy, manual or electronic, all PSS should be developed with regard to two components: (1) references and documentation and (2) job aids (Williams, 2000). The whole set of written manuals, detailed procedures and guiding procedures should be embedded in the PSS in compliance with work requirements. Moreover, job aids consisting of support tools should also be a part of the PSS system to assist employees' work performance (Williams, 2000).

2.10. Electronic Performance Support Systems (EPSS)

The definition of an EPSS is elusive in the literature. Besides, many names have been given to the EPSS, including, performance support systems (Villachica et al., 2006), short form of performance support (Miles, 2003), integrated performance support or online performance support (Ruyle, 2005), a modern method of instruction (Hotek & White, 1999), performance-centered systems (Gery, 2002), information processing support, (Schwen et al., 1998), performance support tools (McManus & Rossett, 2006), and decision support tools (McManus & Rossett, 2006). Regardless of the different terminologies used, Gery (2002) has used recently a more general term, performance-centered systems (PCS), to encompass all learning and performance systems.

In the literature, the recognized gurus on the EPSS are Barry Raybould and Gloria Gery (McKay & Wager, 2007). While Barry Raybould states that computers might be utilized for solving human performance, the term, EPSS, was used firstly by Gloria Gery (McKay & Wager, 2007; Stone & Endicott, 2000). In doing so, Gery (1991, 2002) has suggested that the paradigm shift from traditional performance support such as classroom training to automate performance support systems should become fact as a choice for many organizations, most notably large, learning organizations.

Definitions of the EPSS range widely. Early understanding of the EPSS is based on a conception of hard technologies and computer training (Schwen et al., 1998). From Gery's (1991) perspective, an EPSS is more than technology; rather it is a concept that can be utilized by users in whatever technologies are appropriate to presentation of the support when and where they want to take supports via selected structures. The technology selected for providing the support does not play a pivotal role because descriptions of the EPSS as a concept cannot be reduced to any machine, technique or architecture (Gery, 1991). As Villachica et al. (2006) utter that numerous and different definitions result from the similar design strategies deriving from divergent fields regarding the domination over the future of the EPSS in theory and practice.

Van Tiem et al. (2001) define EPSS as a computer system and software. An EPSS is the computer system that compromises software tools, knowledge and learning experiences so as to improve performance. As for Villachica et al. (2006) definition, an EPSS is the set of methods and resources provided either online or offline to the performers when they need them and in the structure they want with the object of doing their job well in accordance with the organizational objectives. In Carliner's (2002) definition, an EPSS is the system in which online help or tutorial, database, application program and expert system are embedded so as to assist in getting the knowledge and information to be shared throughout the organization. Ruyle (2005) prefers a more compact definition of the system is that an EPSS is a software program that may allow users to supply just-in-time, demand information, guidance, examples, and step-by-step dialogue boxes as to alleviate the job performance. According to Stone and Endicott (2000), an EPSS is a network that provides online and off-line job resources for users. More recently, Gery (2002) defines performance support systems as software applications to be used for sustaining direct support regarding work processes and process support with different components.

Van Tiem et al. (2001) view EPSS as a highly sophisticated job aid. However, they also assert that "EPSS is not an intelligent job aid or a type of computer-based training" (p.70). They continue by saying that job aids and computer-based training are subsets of EPSS. Similarly, Ruyle (2005) states that an EPSS is a computer-based job aid while Ford (2005) defines it as an electronic or online version of job aid. In Miles's (2003) view, an EPSS can be considered as an online help system or electronic job aid and it is a subset of the knowledge management system.

EPSS is the logical extension of using just-in-time training used just before or concurrent with the trainee's need emerges regarding to using a specific knowledge or skill (Van Tiem et al., 2001). Gery (1991) states that on-demand access to all resources and tools so as to find solutions for a problem or perform a task related to job or sometime do the complete procedures of the work is one of the necessary features of the conscious and systematic design of the EPSS.

In an article, Mao (2004) asserts that an EPSS has three explicit propositions. The first principle, just-in-time, represents the deliverance of support when needed. In that situation, learning and working take place at the same time and in a single framework.

Just-enough is a second proposition implying that task-oriented support content or information can be divided into small modules and delivered just enough for the task. The last principle, performance-centered addresses the ultimate goal of the system, continuous performance improvement (Mao, 2004).

In sum, Gery (2002) clarifies that any integrated EPSS should represent and link some attributes. Firstly, an EPSS represents task structuring characteristics of the organization via work processes, procedures, and thinking. Secondly, knowledge such as content, rules and relationships and data both organizational and external data might be depicted in the system. Lastly, both communication channels including e-mail, real-time or others and required tools can be embedded in the integrated system.

2.10.1. The Benefits and Attributes of the EPSS

The main goal of the EPSS is to empower the users to perform at the needed moment (Gery, 1991). Moreover, an EPSS can be designed and developed to improve performance of an individual worker, a group or an entire organization (McKay & Wager, 2007). Helping performers in getting expert advice and support, it is expected that an EPSS can improve the quality of products or end results of the organization (Wang, Nieveen, & Akker, 2007). In general, it is possible to assert that any performance improvement initiative tries to support individuals who work in a specific work environment doing specific job tasks via a designed and coherent work environment (Gery, 2002).

Brown (1996) summarizes the four important goals of an EPSS. The first one is that any EPSS should enable performers to access help, demonstrations, advice, customized templates, database or other support structures for doing their job tasks. Moreover, secondly, an EPSS should be integrated and linked with the work environment. In other words, the EPSS should be an essential part of the task. Thirdly, the support should be provided when needed. Lastly, whenever needed, any technological equipment or software technologies should be supplied within the system.

Similarly, Van Tiem et al. (2001) divide benefits of an EPSS into two categories. According to their classification, an EPSS offers lots of benefits to the users and the organization. For users, (a) an EPSS is integrated to the workplace so that users can work more efficiently and do their jobs faster, (b) an EPSS combines the learning context with the operational context, (c) an EPSS is designed for a varied group of users so that they can adjust to the learning pace and working characteristics of them, (d) an EPSS provides a learning model for users with abilities from which they can actively search information whenever needed, (e) an EPSS coordinates the complexity of the work and work flow for the users with some important functions, such as representation of knowledge with different media, providing tools, information and data, and structuring actions and processes needed to complete tasks and work, (f) an EPSS gives a chance to users to share knowledge through different media tools. To sum, whenever individual users are supported more in their unique tasks, the learning and performance will occur faster (Gery, 1991). For the organization, (a) an EPSS enhances productivity and work flow, (b) an EPSS cuts down on training costs, (c) an EPSS improves the worker's autonomy, (d) providing uniform work processes for users, an EPSS strengthens the quality for the organization, (e) an EPSS helps users build required knowledge as to do jobs well.

Rosenberg (2006) states the benefits of the performance support including: (1) it reduces the complexity of the work processes and tools; (2) it gives performers a chance to configure the format of the EPSS by using it in areas where they feel so impotent or refusing the tools in areas where they feel more proficient at; (3) it can be easily updated and distributed rapidly and firmly with the help of the web and wireless technologies; (4) it decreases the variability regarding the performers' level and sustains the consistency and reliability in the organization; (5) it helps with closing the performance gaps between non experts and experts.

According to Ruyle (2005), organizations can benefit from a well-designed EPSS with the following: (1) problems can be solved correctly, (2) the time required to solve problems can be reduced, (3) the total cost, the number of people and the number of steps in problem resolution can be minimized, (4) the quality of the performer's work life and customers' views to the organization can be enhanced.

The advanced type of an EPSS sustaining immediate access to information has been used by HPT practitioners and researchers taking advance of the specified sources of knowledge that allow them to notify of the communication, problem solving, and decision making in different fields and functions (Ferond, 2006). Moreover, an EPSS helps the employees to adjust their cognitive efforts to do their job well (Villachica et al., 2006). More specifically, it powers users' cognitive capabilities up sustaining an adaptive support for cognitive tasks needed to perform job duties (Ruyle, 2005). According to Ford (2005), EPSS is an efficient way to support applications of skills.

Although, an EPSS is built around the concept of performance, rather than learning, it becomes a training intervention in case performers reach the embedded content or instructional documents (Ruyle, 2005). In other words, users can learn new skills and knowledge using an EPSS; however, facilitating performance in the workplace is the main purpose of the system (McKay & Wager, 2007). In Rosenberg's (2006) view, learning is the secondary goal in the performance support. For Chang (2004), an EPSS should give more than training to the users because the main consideration is performance, not learning.

To help employees understand what they do and to provide learning, information and tools whenever needed, an EPSS integrates multiple solutions with components to associate with performance gaps (Villachica et al., 2006). It helps users apply skills and solve performance problems via providing diversity of contextual, real time job aids, references, help files and resources (Ford, 2005).

In sum, an EPSS enables employees to access all the tools and resources to do their job well and efficiently. It is possible to assert from literature that work efficiency can be increased via using an EPSS. The main benefits that an EPSS provides regarding work efficiency can be summarized as follows: An EPSS:

- increases the job productivity (Altalib, 2002; Chang, 2004; Van Tiem et al., 2001),
- enhances the worker autonomy (Altalib, 2002; Chang, 2004; McGraw, 1994b),

- structures jobs and job tasks (Altalib, 2002; Banerji, 1999; Moseley & Dessinger, 2007; Van Tiem et al., 2001),
- systematizes best practice (Chang, 2004),
- adjusts both individual learning and job performance (Chang, 2004; Moseley & Dessinger, 2007),
- enhances knowledge capitalization (Altalib, 2002; Brown, 1996; McGraw, 1994a; Van Tiem et al., 2001),
- helps employees accomplish frequently repeated job tasks and procedures automatically and uniform work practices (Altalib, 2002; Brown, 1996; Moseley & Dessinger, 2007; Rosenberg, 2006; Van Tiem et al., 2001),
- provides performers with access to nice-to-know information, such as rules, relationships and procedures (Moseley & Dessinger, 2007; Rosenberg, 2006; Van Tiem et al., 2001),
- decreases disruptions and time which are needed for training (Altalib, 2002; Lessard & Mowat, 1998),
- reduces errors and mistakes because all available support and information can be accessed immediately whenever needed (Altalib, 2002; Banerji, 1999; Gery, 1991, 2002; Hotek & White, 1999; Lessard & Mowat, 1998; McGraw, 1994b; McKay & Wager, 2007; Van Tiem et al., 2001),
- provides employees with immediate access to the most recent procedure, data and required information (Bastiaens, Nijhof, Streumer, & Abma, 1997; Lessard & Mowat, 1998; Van Tiem et al., 2001),
- enables performers to share information with their colleagues (Moseley & Dessinger, 2007; Peng et al., 2009; Van Tiem et al., 2001),
- reduces training cost and time (Altalib, 2002; Banerji, 1999; Bastiaens et al., 1997; Chang, 2004; McGraw, 1994b),
- declines information overload and paper documentation (Chang, 2004),
- closes the performance gap between non experts and experts (Gery, 2002; Nguyen, 2006; McKay & Wager, 2007; Rosenberg, 2006; Villachica et al., 2006).

2.10.2. Shortfalls of the EPSS

The EPSS is sometimes successfully designed, developed and implemented in some cases and organizations; however, it may also fail in others. An EPSS has several limitations regarding theory of learning and workplace training. To illustrate, performers sometimes may be inadequate to make appropriate decisions in terms of determining the type of support, contents or time (Mao, 2004).

Regardless of providing lots of benefits to the organizations, it has not been drawn to the concept and potential of the EPSS because of several reasons (McKay & Wager, 2007). For example, although an EPSS helps organizations reduce the need for training as a basic premise, it is not completely possible to eliminate this need (McKay & Wager, 2007). In other words, being unsuccessful to eliminate totally the need for training, potential costs, time, difficulties assessing the return of investment, may be possible reasons why the EPSS has not been widely accepted (McKay & Wager, 2007). Moreover, providing, developing, implementing, supporting and carrying out the required communication and computer infrastructure are the main challenges for the organizations (Maughan, 2005).

2.10.3. Selecting an EPSS as a Performance Intervention

The existing literature on an EPSS demonstrates that it can be implemented in many different settings via integrating and linking to work interfaces and flows to improve individuals' performance (Nguyen, 2010). In general terms, Rossett & Schafer (2007) summarize the situations in which individuals and organizations need to look at the performance support. Performance support is appropriate when (1) the work is so complex and covers many steps or has many features, (2) the effects of error is undesirable, (3) performance relies on a large body of information, (4) knowledge, procedures, or approaches that change frequently are determinant for performance, (5) self-assessment and improvements with standards are solutions for performance issues, (6) the job tasks are considered as so simple and there is high turnover, and (7) when infrequent performance exists in the organization.

According to Van Tiem et al. (2001), organizations might select an EPSS as a performance intervention in the event that (a) the organization needs to have a large body of potential performers, (b) job tasks shaping the works are suitable for the use of an EPSS, (c) a computer is an indispensable tool for users, (d) task complexity of the works has many alternative branches and many variables leading to be broad and profound, (e) system is appropriate for both novice and experts users, (f) turnover rates are high in an organization requiring to train new performers or users, (g) developing a new system for an organization is needed, (h) performers develop and share knowledge capitalization in an organization.

Ruyle (2005) recommends the selection of the EPSS as a performance intervention for the organizations in some situations when there are (1) performance obstacles resulting from knowledge and skills deficiency, (2) job tasks related to performance issues are difficult to be done, (3) serious consequences if job tasks are performed insufficiently and adequately, (4) job environments which accommodate the EPSS hardware. Differently, in Rupel's (2003) view, an EPSS is the right approach if the following conditions occur in organization: (1) expectations in organization for employees are high, (2) performers need to be up-to-date regarding job related information, knowledge based and technological competencies, (3) performers' learning style are fitted to self-directed learning, (4) set-up time exists for the development of the system and (5) experts are not accessible on site.

In sum, the literature demonstrates that an EPSS might be applied as an ideal intervention to solve different types of performance obstacles in the organizations. It is apparent that arguments for the selections of an EPSS as a performance intervention change in the field because both broader definitions have been proposed and the conceptualization of the term has been expanded recently. In the light of this transformation, Nguyen (2010) asserts that an EPSS might be a reasonable intervention when performers make decisions about their job. Basically, as long as the EPSS has a good interface and solve performance problems obtained from the analysis for the performers, application will be accepted and used by the end users (Ruyle, 2005).

2.10.4. EPSS Levels (Categories of the EPSS)

As McKay and Wager (2007) assert the original definition of EPSS and other approaches to the usage of the EPSS, most notably pragmatic view has changed and evolved over time. While an EPSS was considered only as a searchable database to provide users with organization's policies, procedures and help system at the beginning, a dynamic and broadened vision of EPSS has developed according to which an EPSS should do more than providing documents and that it should even perform all the functions (McKay & Wager, 2007). Then, Gery (2002) changes the point of view that providing integrated support for process, knowledge, tools, data, and communication is the main characteristics of the EPSS which is built in a computer-mediated work environments or software applications.

In general terms, although the ultimate goal of the EPSS, presenting the contextualized support when needed remains the same, it varies extensively with many potential components (Villachica et al., 2006). In that sense, having decided that an EPSS is a viable solution for the organization, each performance problem should correspond to the EPSS components (McKay & Wager, 2007). As Van Tiem et al. (2001) point out that designing EPSS levels might vary in complexity, from simple to complex. In fact, an EPSS may combine different elements of interactive learning, electronic communications, and expert systems. Gery (1991) states performance support of three types: (1) external, (2) extrinsic and (3) intrinsic.

2.10.4.1. External Support

External support provides a performance support for users outside the workplace that is why they have to break from work to obtain supports (Rosenberg, 2006). In other words, users should completely leave the workspace in case of taking performance support as to get at computer-mediated or other advice such as manuals, websites, or help desk. Therefore, it allows users to supports for the job tasks; however, this type of support is not part of the work flow of the task, rather it takes place as off-line (Rosenberg, 2006; Stone & Endicott, 2000).

2.10.4.2. Extrinsic Support

Extrinsic support is a sub-system that is integrated into the main system but placed outside of the performance environment. In other words, extrinsic support is not placed in the primary workspace of the users (Stone & Endicott, 2000). Although this type of support is available to be used within the performance system like the external support, the users have to leave the main frame of the system so as to obtain required supports (Rosenberg, 2006). This accounts for the fact that users have a chance to take advice or refuse a support or other resources by turning it on or off (Van Tiem et al., 2001). This level of support is more effective than the external support and includes more context based opportunities to obtain a support which is related to what the users are to perform (Rosenberg, 2006).

2.10.4.3. Intrinsic Support

Intrinsic support implies a transparent interface design with the system and it is completely embedded within the system (Rosenberg, 2006; Stone & Endicott, 2000). In this level, users may elicit a support without performing any action. Indeed, they may not realize any differences while doing their job and tasks. In most cases, users perform their job tasks using intrinsic EPSS (Stone & Endicott, 2000). Tools and interfaces that automate job tasks and processes reduce the complexity of the job processes and display embedded knowledge in the work flow. Interfaces can be given as an example of intrinsic support (Nguyen et al., 2005). As Gloria Gery (as cited in McManus & Rossett, 2006) offers that 80% of the performance support delivered via the computer should become intrinsic so that performers have a chance to do their work with the performance support that is integrated into the real job environment.

Apart from Gery's classification, Barry Raybould (as cited in Cavanagh, 2004) classifies types of an EPSS as stand-alone and embedded. While the former corresponds to Gery's external and extrinsic definitions, the latter resembles the intrinsic definition of Gery's terminology. In other words, while stand-alone electronic performance support is presented to the users when doing their job and when they however have to get information by querying, embedded support is integrated with the work processes to be accessed during the performance of job tasks (Maughan, 2005).

Similarly, using the framework of Gery, Raybould and others, Cavanagh (2004) proposes a new spectrum of support. According to Cavanagh's (2004) framework, categories of performance support can be classified as external, extrinsic, intrinsic, intuitive and intelligent. The extrinsic, external and intrinsic levels correspond to Gery's and Raybould's definitions. However, intuitive support describes a more adaptive and transparent support integrated into the work environment and workflow process. Similarly, intelligent support, the highest level of the spectrum, represents full transparency regarding the task and associated performance support in Cavanagh's framework. Artificial intelligence and intelligence agents are the main elements of this type of support (Cavanagh, 2004).

In Gery's (1991) view, different support mechanisms and software applications may be embodied in the support system. Advisory or expert systems, interactive productivity software, application software, help systems, interactive training sequences, assessment systems, monitoring and feedback systems are the examples of possible types of software found in an EPSS (Gery, 1991). Although each component and application provide separately some benefits, proper embodiment and combination of the components and applications are vital to provide effective and desired support to the performers (Chang, 2004).

2.10.5. Support Structures (Components) of the EPSS

In the literature, there are many views about the components of an EPSS. Gery (1995) represents twelve support structures and their uses. Maughan (2005) lists the support structures' possible formats adapted from Gery's (1995) classification (Table 2.8).

Table 2. 8

Possible Support Structures (Gery, 1995, pp. 52; Maughan, 2005, pp. 51)

Support Structures	Formats	Behaviors and Uses
Cue Cards	Single ideas or small sets of fact	Cue cards can be used to follow task guidance and content or underlying logic via linear, sequential or branched tasks.
Explanations or Demonstrations	Mini lessons or graphical presentations	Orientation, skill development and understanding are the main objectives of these structures presented interactive or not.
Wizards Assistants or Helpers	Sets of queries and prompts	They can be used for task execution and guidance. They can be designed to provide progress to users through work task, to summarize choices or conditions, and produce outputs while presenting options, choices and different sources of data.
Coaches or Guides	Step by step instructions	Task guidance and completion through work flow can be controlled by coaches or guides.
Searchable Reference	Presentation of information via charts, tables and graphs	Searchable reference can be used in information search, retrieval and browsing via accessing content or knowledge database.
Checklist	Mini checklists of flow charts or processes	List of items or task completion criteria can be used to be filled out by performers or systems.
Process Map	Graphical representation of flow charts or decision trees	Charts, diagrams, flow charts and lists can be used to overview all processes.
Examples	Mini cases	Examples are more powerful in idea development and understanding.
Templates	Pre-existing solutions to design or process problems	Templates consisted of pre-structured formats or shells are used for consistent and rapid task completion.
Tips	Hints to optimize efficiency	Hints, tips and alternatives are used to give short information about context or condition.
Practice Activities	Sample problems or exercises	These types of activities are used for.

Table 2.8 *Continued*

Assessments	Clusters of questions	skill and confidence building. Assessments can be considered as performance and knowledge evaluation.

More recently, Gery (2002) using a broader term performance-centered system classifies the four primary components of the performance support environments: (1) performance support tools: these tools are comprised of software and job aids to organize work processes and help performers to achieve specific outputs, (2) reference: reference consists of content and resources designed to be accessed whenever needed for enabling performance, (3) instruction: this component is formed by structured courses and instructional units to be accessed outside the work environment, (4) collaboration: this component provides an interaction between performers to solve problems, create knowledge, and share and gain information.

Designed and developed support structures and components should be linked to each other and each structure should be accessed easily when needed (Chang, 2004). Therefore, design and development of the system should be founded on the strategy that all users can navigate quickly or easily between each component and structure.

2.10.6. The Analysis, Design, Development, Implementation and Evaluation of the EPSS

Similar to the HPT model, Nguyen and Woll (2006) propose a model to be used while designing and developing performance support systems by human performance technologists. The model is made up of five phases, performance analysis, EPSS analysis, design, development and evaluation.

2.10.6.1. Analysis of the EPSS

According to Nguyen (2010), performance analysis and an EPSS analysis phases as a first step require some critical and important processes such as conducting HPT analysis, quantitative and qualitative assessments. Similar to HPT analysis, Nguyen and

Woll (2006) suggest than Gilbert's BEM can be used as a diagnosis tool for the selection of the EPSS. In other words, although performance analysis step in the model is compatible with basic HPT analysis process, an EPSS analysis includes conducting both quantitative and qualitative assessments regarding performers' preferences, environmental conditions and trends so as to obtain information about specific needs related to the EPSS. Besides, analysis of the EPSS should include not only tasks, contents or procedures but also the performer or the learner of the concerned the tasks, contents and also procedures (Gery, 1991).

2.10.6.2. Design, Development and Implementation of the EPSS

The literature demonstrates that many guidelines can be followed in the phases of design, development and implementation of an EPSS. The main considerations can be grouped under the selection of technology or architecture, and the type (s) of the EPSS to utilize via integration and alignment of the work environment of the organizations.

With the advances of technology, the EPSS can be designed and developed using a wide diversity of delivered alternatives, such as desktop and laptop computers, personal digital assistants (PDAs) and other components (Villachica et al., 2006). Determination of the EPSS architecture includes selection of delivery devices, interfaces and databases (Nguyen, 2010). Stone and Endicott (2000) summarize the five main characteristics of the efficient EPSS which should be taken into consideration while designing and developing processes. Firstly, an EPSS should be delivered via a user interface that enables users not to spend too much time. Secondly, components of the system should be integrated as much as possible. Thirdly, on-demand access to support and other components should be provided. Fourthly, an EPSS should be designed with regard to all users' expertise and individual differences. Lastly, interactivity between the system and users should be sustained.

As Gery (1991) states that it is really difficult to determine a detailed development methodology for EPSS. The technology selected for providing the support does not play a pivotal role because descriptions of the EPSS as a concept cannot be reduced to any machine, technique or architecture (Gery, 1991). Therefore, a standard development methodology which starts with analysis and goes through design, development, testing, revision, implementation and evaluation stages is appropriate for EPSS (Gery, 1991).

As for the types of an EPSS, it can be asserted that the most neglected phase of the design process is the selection of the proper type of support system (Nguyen & Woll, 2006; Nguyen, 2010). It may require that designed and developed EPSS might be implemented more than one type of the system (Nguyen, 2010). In general, the potential scope of the performance support depends on both the scale of the EPSS and the extent of integration into the organizational work processes (McKay & Wager, 2007). Therefore, the design of the EPSS should address and link with the nature of the work. As Villachica et al. (2006) suggest that the sequence of screens, windows, materials displayed, fields and buttons should fit with the natural workflow and the logic of the job performed by employees. To serve that purpose, Watkins (2007d) proposes the general design and development processes for an EPSS. Starting with performance requirements and performance analysis phases, the framework continues with system specifications, performance assessments and selecting performance support requirements. According to Watkins (2007d), media and software requirements should be defined and a prototype should be designed. After required reviews and changes, development of the EPSS should be completed and evaluation should be done (Watkins, 2007d).

After the design phase, the next step in the process is to develop the system. In this phase, developing support content and integration of the system with work interface are the main considerations of the whole process (Nguyen & Woll, 2006).

Villachica et al. (2006) note that EPSS applications might be designed with on-line and off-line components embedded and contextualized in the systems, most notably enormous great applications. Moreover, the content of the EPSS is built in text and visual databases. In doing so, databases or content repositories in EPSS architecture are used mainly to access the support content (Nguyen, 2010). While the text database embodies in content including procedures, concepts, explanations, specifications, commands, glossaries, visual database encompass pictures, diagrams, graphics, maps, videos so as to be used as models, typical images, points of reference and so on (Gery, 1991).

As Ruyle (2005) asserts that an EPSS is not only the system which is used for accessing the electronic page or multimedia documents. Therefore, concepts, facts, examples and procedures as variety of information can be revealed and represented in different media in developing an EPSS (Gery, 1991). Moreover, that information can also be linked internally and externally to the whole system (Gery, 1991). To increase efficiency, Gery (1991) recommends that the user interface of the EPSS should be adequate, clear, simple and user-friendly to provide needed information for users with a meaningful and straightforward way because it is the most important feature of an efficient and successful EPSS. Moreover, the interface should also help users to be able to follow appropriate activities and processes while giving required support (Stone & Endicott, 2000).

2.10.6.3. Evaluation of an EPSS

Gery (1991) asserts that the evaluation of the EPSS is really difficult because assessing the effectiveness, impact and utilization vary greatly related to the organization's conditions. Thus, similar to general evaluation strategies, determined success criteria should be listed during the analysis phase (Nguyen, 2010). In that manner, the evaluation and effectiveness strategy should be linked to the business goals of the organization (Lee & Owens, 2004; Ruyle, 2005)

As for the evaluation phase of the system, the summative evaluation of the EPSS gives information about the impact and the overall quality of the system on the organization, to illustrate; what worked well, what could be improved and what potential problems in the flow might affect the job performance (Villachica et al., 2006). To obtain these valuable results, Nguyen and Woll (2006) suggest that Kirkpatrick's framework can be used for the evaluation of the EPSS intervention.

2.10.7. Related Research

This part essentially summarizes the research studies related with the analysis, design, development, implementation and evaluation of the EPSS. In the literature, case studies have shown that performance technologists have a chance to apply EPSS to different varieties of settings and performance problems. To illustrate, performance support systems have been used and studied in a wide range of educational settings.

Darabi, Mackal, & Nelson (2004) implemented an EPSS. ePlanTM, to conduct performance analysis in three professional organizations. The main object of the study was to understand how effectively an EPSS could help acquire competence and how it promoted students' (n = 12) self-regulated learning in the performance analysis course at Florida State University. The EPSS was designed for the United States Navy and it was used to identify performance barriers and offer solutions with providing some analysis activities. Using both qualitative and quantitative data collection methods, self-efficacy measure, students' feedback and focus group interviews, researchers concluded that the use of ePlanTM provided a significant improvement in students' self-efficacy and extended their understanding of HPT via an improved utilization of their competencies.

Wang et al. (2007) conducted a research on an EPSS, CASCADE-MUCH, and its effectiveness and practicality on teachers in Shanghai, China. Using the evolutionary prototyping approach, CASCADE-MUCH (Computer Assisted Curriculum Analysis, Design and Evaluation: Multimedia Curriculum Design in China) was designed to assist teacher-designers in the development of instructional scenarios for multimedia curricula. Four main components, scenario, content, support, and interface were designed and developed through four rounds of prototyping. At the end of the third cycle, formative evaluation was conducted with eight university experts. After prototyping cycles and revisions, two summative evaluation studies were conducted with teacher-designers (n=6 and n=13) to test the practicality of the EPSS. Results showed that the EPSS was practical for the teacher-designers and the evolutionary prototyping approach as a design process improved program quality and helped designers to clarify and gain knowledge regarding design processes.

In the experimental study of Stoyanov, Kommers, Bastiaens, and Mediano (2008), the effect of performance support system on achievements and attitudes of students studying physics engineering were validated with a pilot (n= 9) and experiment studies (n=40). The performance support system for learning purposes (PSSL) used in the study consisted of four components, advisory, information, training and user-interface to provide fundamental framework of the system. A pilot study was conducted to obtain some initial evaluations regarding the impact of the achievements and attitudes and to make technical revisions for the experiment. Using the pilot results, positive attitudes to the system and increasing motivation for studying, an experimental study with forty first year students in higher engineering was conducted to test the expectations of the pilot study and accumulate evidence-based framework. While the students in the experimental group (n=20) worked with PSSL, the control group (n=20) worked under traditional instructions, face-to-face lectures and laboratory exercises. Attitude and reflective questionnaires and performance tests were used to gather data for validation of the assumption according to which experimental group students would score significantly higher than the students in the control group. Results show that compared with traditional instructions, PSLL generated significantly better scores regarding achievements of the students. Moreover, students indicated positive attitudes toward the performance support system and were fascinated by the integration of the system with higher education curricula.

In their evaluation study, Van Schaik, Pearson, and Barker (2002) revealed that an EPSS was noteworthy for improving performance and knowledge levels of students from the psychology department at the University of Teesside (n= 89) in doing tasks related to quantitative research methods and concepts. The system was designed and developed through an on-going research program and helped students to learn the most important topics relating to quantitative research methods and statistics. The EPSS consisted of five distinct components, the database, the help system, the advisor system, the personal area and notes, and the performance aids. Data was collected through a survey divided into four parts. While the first section tried to measure students' content related knowledge, demographic details, students' task performance and acceptance of the system were gathered with the second, third and fourth sections respectively. Results show that students performed well; however, this outstanding performance was not significantly related with knowledge of concepts and achievement of the EPSS usage. Moreover, researchers concluded that there was a significant correlation between the intention to use and the perceived usefulness of the system.

Another evaluation research on an EPSS was conducted by Wild (2000) to present the design of the lesson planning system and to examine the effectiveness of this system. The system (LPS) was designed and developed to provide electronic support for the task of the lesson planning process. Both instructional and performance support were provided to users with two components to assist learning and task performance. Having been used by four students over two weeks, the evaluation research was conducted for investigating the value of the system regarding how learning might occur while using the EPSS. The data was collected through observations, interviews and documents, six lessons plan was produced by the students. Results indicated that all participants favored to use and experience the system which could be seen as an alternative instructional model. Moreover, the researcher concluded that while students' usage of the performance components increased over the tasks, the use of the instructional components by students declined gradually.

Barker et al. (2007) conducted a research with a three-group, pretest/posttest design to investigate the effect of two EPSS components on first-year psychology students (n=99). An EPSS, the Epsilon, was designed and developed to help undergraduate and postgraduate students to find and search out information and knowledge resources within a library. The system consisted of two components, the tutorial and game components. While the group1 (n=32) studied only the tutorial component, the group 2 (n=39) studied the game component. Both components were studied and played by the group 3 (n= 28) through a research period. During the evaluation process, students' knowledge, confidence and pages that recorded their task performance were measured on a pre-test and post-test basis. Moreover, a questionnaire was administered to investigate their acceptance and experience levels of the system. Results showed that students' confidence in their knowledge was increased with using the tutorial component. Moreover, researchers illustrated that the tutorial and game components of the EPSS were useful for the students.

In their study, Moore and Orey (2000) reported that an EPSS, *Teacher Tools*, declined the required time for completing the task performance of teachers who participated in the study. The main aim of the study was to examine how teachers used an EPSS and which factors affected their performance and attitudes toward the use of the system. The data was collected from four middle school teachers and observations, questionnaires, anecdotal logs, database records, and interviews were selected as the main data collection methods. The *Teacher Tools* was designed and developed to assist teachers to perform some of their tasks such as planning, assessment, information management and communication. The four participants were determined using purposeful sampling with maximum variation method. Researchers concluded that research findings were consistent with other researches and that productivity could be improved by computer technology while some factors such as time, technology support, design issues and implementation processes might also affect the overall implementation processes.

In one of the few qualitative studies, Mitchem, Kight, Fitzgerald, Koury, and Boonseng (2007) conducted a research for investigating the usability and perceived effectiveness of the EPSS, Strategy Tools, on secondary students with mild disabilities. The EPSS was consisted of 39 tools to help students with disabilities to develop self-regulation, learning strategies and planning skills. Two special education teachers and four students with behavior disorders were the participants of the study. Semi-structured interviews were conducted with both teachers and students and also focus group interviews were held with these four students. Results revealed that an EPSS could be used as an assistive technology that helps students with disabilities to gain and practice the self-management and self-regulation skills.

Kert and Kurt (2011) conducted an experimental study to investigate the effects of the EPSS developed to be used in programming language courses at the undergraduate level. The main purpose of the study was to understand the effect of the system on students' self-regulated learning skills. The pre-test and post-test control group design was selected as a research design and the data was collected through an evaluation form and surveys. 44 second grade students were divided equally into two groups as experimental and control groups. Results revealed that there were significant differences between the groups regarding cognitive, meta-cognitive and resource management strategies while there was no statistically significant difference between the groups respecting motivational beliefs.

A more recent study investigated the instructional effects of an EPSS, MAPS, developed for pre-service teachers to assist in developing technology integration strategies (Kalota & Hung, 2012). In this formative evaluation study, the data was collected in two phases and both quantitative and qualitative methods were used. The pre-service teachers (n=28) were divided into two groups, experimental and control. While the EPSS was used only by an experimental group, the control group received and used only static documents in the evaluation processes. Results revealed that there was no significant difference between groups regarding their pretest and posttest scores. Moreover, researchers concluded that participants had a very positive attitude toward the EPSS.

Apart from educational settings, performance support systems have also been widely used, established, chronicled and studied in a wide diversity of companies, industries, agencies and institutions. For example, Van Schaik, Barker, and Famakinwa (2006) conducted a case study to design and evaluate an EPSS, Epsilon, designed for libraries. The EPSS was designed to help students use library facilities. Having realized some additional adequacies regarding usage of the system, researchers embedded tutorial and gaming components to the EPSS for library services. Then they conducted an experimental evaluation with three groups of students (n = 20) to understand newly added components' effects. A three-group, pre-test and post-test design was selected as a research method and a questionnaire was used to gather information about systems' acceptance and students' experiences of using new EPSS components. Results indicated that both components were useful and some suggestions were made for future developments. Moreover, researchers concluded that if more integration with library's existing facilities is sustained, both library's facilities and services may improve; therefore, both the quality of materials that students' use and their coursework might increase.

A 2006 case study by Schatz and Schwen examined the design of an online performance support system that is to be used by military aircraft maintenance technicians. Data was gathered through group meetings, interviews, site visits, observations and reviewing the existing systems to understand the application of the design method, the USE model (user-centric analysis, sensemaking, evolution), which is used for initial function set of online support system. The results showed that any dynamic and growing support systems should be designed for the needs of all the levels of the organizations via focusing on both practice and information covering all activities. Moreover, they concluded that systems should be personalized to the target population so as to support, create, store or share knowledge beyond the organizations.

Joyce (2002) conducted a project for understanding to what extend Royal Navy technicians practice on the EPSS compared to a traditional trained group in their pre-joining training courses. Developed EPSS consisted of three parts, hardware, mobile computer (voice tablet) and the peripherals to be used in normal training courses for diagnosing faults in navigation radars. While the EPSS content was assembled form technical books, handouts and instructors' experience, support information was presented on one screen with location diagrams, circuit diagrams, circuit and tool use animations, and reference documentation. Data was obtained through performance data which measure time to diagnose cause of faults, time to repair faults and number of mistakes made, surveys and observations that were taken with 36 Royal Navy technicians after 90 minutes of orientation and 1.5 hours of training. The results suggested that technicians from the EPSS group performed better than the traditionally trained group. Moreover, the researcher concluded that overall ratings in terms of the effectiveness of the new method were largely positive and the time taken to diagnose and repair faults decreased in the EPSS group. To sum, the EPSS was offered as a new paradigm for engineering training in the light of these results.

Bastiaens et al. (1997) conducted an experimental study on an EPSS and its effect on insurance agents regarding whether it could increase in productivity and improve learning. To validate the assumption that an EPSS would be more effective than traditional methods of learning, insurance agents (n=36) were divided into three groups. While the first group received instructions via traditional methods, the second group of participants worked with an EPSS. The third group was a control group. Using both qualitative (interviews, observations and discussion) and quantitative (questionnaire and performance data) data collection methods, the effectiveness of the EPSS regarding work, support and learning were evaluated. Results indicated that an EPSS offered cheaper work and support opportunities and some improvements to the learners; however, an expansion of productivity could not be produced in the implementation.

A survey study by Chang (2004) investigated the perceived performance of the six components of the EPSS and contributions of these components to the perceived benefits of the system. A survey instrument was developed and mailed to the EPSS coordinators in the USA (n=79) to obtain information about demographics of the respondents, and their opinions on the performance of components of an EPSS and benefits of the EPSS use. While the advisory system, data/information base, learning/training support, online help/reference, productivity software and user interface were selected as components of the EPSS and used as independent variables, the overall EPSS use benefit consisting of thirteen variables was the dependent variable of the study. According to the EPSS coordinators' opinions, all six components were beneficial and effective throughout the use of the EPSS. Moreover, they stated that the most effective components were the user interface and online help/reference. Although they were perceived as the most effective, a data/information base and advisory system components were perceived as the highest contributors to the overall benefit of the EPSS usage. In general, results showed that an EPSS usage is effective and efficient in improving both individual and organizational performance.

Chatterjea, Lum, and Bhandari (2011) reported brief descriptions of the two EPSS projects, EPSS-I & EPSS-II, pursued by Maritime Technology and Transportation (MTT) Department of Singapore Polytechnic. The first EPSS was developed to decrease the records of accidents and to increase the levels of safety for lifeboat handling. Simulations and text, audio and graphics were selected as components which were embedded into the modules. As for the second EPSS project, EPSS-II was developed to regulate the nature of maritime managements and their related complications. A knowledge-based system was used and generated with two components. The first one was used to take a guidance regarding various events. The second component was developed for capturing a knowledge designed dynamic interface. The authors revealed that developing a large scale EPSS for maritime employees provided valuable experience which would lead to a growing interest in the use of the EPSS.

In another research, Nguyen (2009) conducted a study on employees from different companies (n= 78) to investigate users' attitudes toward the EPSS and/or training intervention. A tax software application, a web-based training course, a performance support system and a task scenario were used as materials in the study. Data was collected through a post-task attitude survey and an interview questionnaire. Follow-up interviews were conducted with twenty one users to understand their opinions on the program. In general terms, a posttest-only control group design was selected as research design for this study. While one group of randomly assigned participants received training only, the other group of users received an EPSS only. Treatment group different from others received both pre-task training and was provided to use the EPSS while completing the task. Results showed that the participants who received only an EPSS and received both training and an EPSS demonstrated significantly higher attitudes than the individuals who received training only. Based on these results, the researcher offered and discussed how the best combination of these performance interventions would be designed and implemented for the organizations.

A study by Nguyen et al. (2005) investigated the effect and impact of different types of EPSS in terms of user performance, attitudes, usage of the system and time on task scenario. Employees (n=72) from a semiconductor manufacturing company were asked to perform a task scenario and received external, extrinsic, intrinsic performance support or no system support while doing a task scenario. A posttest-only,-control group design was used as a research design to measure the criterion. Data was collected through attitude surveys and database records. Results showed that there were significant differences among the employees regarding their performance, attitudes and use. More specifically, firstly, employees who had received any type of support from an EPSS performed better than others who had not received an intrinsic, external or extrinsic support. Secondly, the intrinsic and extrinsic groups performed significantly better the task scenario than the group who had not received any support. Moreover, survey results revealed that the support group had significantly more positive attitudes.

While extrinsic support was preferred by participants, the intrinsic group spent more time to complete the task than all other groups.

In one of the few empirical studies, Nguyen and Klein (2008) compared the effect of implementing an EPSS, training and a combination of these two interventions in terms of user performance, time on task, and time in training for employees (n=78) from multiple companies. The tax software application supplied with a performance support system designed as an extrinsic help system was used in the study. A posttest-only, control group design was used as a research design for the study. Employees were divided into different groups as “training-only”, “EPSS-only”, and “training and EPSS”. Questionnaires and database records were the main source of data. Results supported the idea that the support groups either with only EPSS or training and EPSS performed better on a tax preparation procedure than the “training-only” group. Moreover, researchers concluded that more time was spent for completing the task by the “training-only” employees. This result also indicated the fact that there was a negative correlation between the time on task and the performance of the employees.

Moving into the comparison of the use of different types of performance support interventions, in 2007, Frank Nguyen, and Matthew Hanzel examined one of the global organization’s external and extrinsic performance support use results over a four-year period. The organization is labeled as the group in the article to protect its anonymity. According to the results, extrinsic support was preferred rather than external help structures. Moreover, the external support was abandoned gradually over the periods and searching feature of the external support was increased substantially while the external search hits to the applicable objects remained about the same.

A more recent study investigated the effectiveness of an EPSS for learning and performance support in corporate settings (Gal & Nachmias, 2011). Randomly selected service representatives (n=294) participated in the study and they were requested to complete a task scenario using the company’s main work system and embedded both external and intrinsic support systems. Results revealed that the intrinsic support demonstrated superiority over the external support. Moreover, researchers concluded that the performers should have some skills such as an ability to locate and process information, and convert declarative knowledge into procedural knowledge while using the external support structures.

2.11. Summary

This review of literature chapter has been structured according to the theoretical perspectives of the study. Therefore, the key concepts, the models used in the study, and frameworks have been reviewed in this chapter.

Because the main theme of this study encapsulates the major steps of the performance improvement initiative; firstly, performance as a key term, and individual and organizational performance have been presented. It can be summarized that all performance factors and elements affect the organizational outputs and results. The HPT and the HPT model followed ın the study as a framework provide a guide map for practitioners to improve performance related issues detected in the organizations. In doing so, any initiative should begin with performance analysis and cause analysis steps. The performance analysis phase includes determining and identifying a complete perspective about the organization via analyzing mission and vision statements, goals, system design, capacity and motivational factors. Similarly, the cause analysis step involves determining the root causes of performance issues that affect performance of the organization.

Gilbert's BEM as a diagnostic tool offers a systematic approach to find out possible causes of performance factors from a behavioral perspective. According to the model the workplace performance is affected by six major components grouped under two major headings: environmental supports and person's repertory of behavior. Although these factors have an effect on the performance outcomes, the work environment rooted components lead to the greatest shortfall of the results.

Having been completed the analyses phases, any practitioners should select the best intervention so as to improve performance of the organization. In the literature, there are many models and frameworks offered as a solution. In this chapter, these frameworks and general decision structures have been presented.

An EPSS as an alternative learning system to the training aims to guide and improve users' performance directly whenever needed. As a non-instructional performance support system, an EPSS provides performance support with just-in time and just-enough information. In the literature, there three types of EPSS: Intrinsic, extrinsic, and external support systems. Using with these types, the performance support can be presented to the users with some support structures. These different types of support structures provides users to select desired and appropriate help contents while they need to take a performance support.

As for the evaluation of the interventions, there are four types of evaluation methods in the literature: formative, summative, confirmative, and meta evaluations. To assess successfulness and effectiveness of the selected and implemented intervention, Kirkpatrick's Four Levels of Evaluation Model can be used by the practitioners. The model consisted of four levels: reaction, learning, behavior, and results. Because the model is compatible with the major concepts of the HPT, it can be used for non-instructional performance improvement interventions such as an EPSS. Different from the original model, the researchers offer that only second level of the evaluation step might need to be changed to the implementation rather than the behavior. Moreover, the model can also be extended with additional levels. Kaufman's mega planning framework emphasizing the societal value that the implemented intervention produces provides practitioners evaluating the societal impact.

CHAPTER III

METHODOLOGY

3.1. Introduction

This chapter presents a detailed description of the research methodology that was deployed in the study. Research questions, design of the study, selected research methodology with the type of mixed method research design, population and sampling, the data collection methods and the instruments including the pilot study with findings of the first phase, the data analysis procedures, validity and reliability issues, and the major attributes and roles of the intervention (EPSS) will be presented and described.

3.2. Research Questions

The main aim of the research is to identify existing information (mission, vision, workflow processes, performance criteria, etc.) and root causes of performance, to design and develop an EPSS and evaluate the effectiveness and impact of the intervention associated with forensic services and activities at the Crime Scene Investigation and Identification Unit (CSI). Therefore, the research questions with sub-questions are:

1. What is the value of the CSI Unit's existing information to which the HPT initiative intends to contribute?
   1.1. What are the visionary goals of the CSI Unit?
   1.2. What are the missionary goals of the CSI Unit?
   1.3. What are the expected performance criteria?
   1.4. What are the basic workflow processes of the CSI Unit?

1.5. Which extant and intrinsic data obtained from official sources can be used for the performance improvement initiative at the CSI Unit?

2. What are the root causes of the performance factors required to be improved in order to meet the goal of efficient and effective forensic services and activities offered by CSI sections?
   2.1. Are the root causes of the performance factors associated with the environmental support?
   2.2. Are the root causes of the performance factors associated with the repertory of behavior?
   2.3. How well do the three measures of performance factors (workplace, competency, and job value) predict perceived organizational performance of the CSI Unit?
   2.4. How do CSI officers prioritize determined factors regarding both individual and organizational performance?
3. Does the EPSS intervention as a performance improvement initiative achieve the impact, effectiveness and perceived benefits expected on individual and organizational performance?
   3.1. What is the reaction of the CSI officers to the EPSS intervention?
   3.2. To what extent are the EPSS types and support components being deployed and used as they are planned?
      3.2.1. To what extend do the EPSS types (intrinsic, external, or extrinsic) contribute to the CSI officers' productivity?
      3.2.2. Which support structures are heavily used? Which are preferred?
   3.3. To what extent is the EPSS perceived to improve performance of the CSI officers?
   3.4. To what extent does the EPSS intervention help produce perceived valuable results for the CSI Unit?
   3.5. To what extent is the EPSS intervention perceived to have an impact on the society?
   3.6. What revisions are needed?

3.3. Research Design of the Study

This study describes the application of the HPT model flowing the basic phases at the CSI Unit. The HPT model served as a theoretical framework for the study to determine the requirements, existing information of the CSI Unit and causes of performance issues, as well as the design and development of the EPSS as a performance improvement initiative, and lastly the evaluation of the EPSS. Using the major phases of the HPT model, the research design of the study was composed of three main phases (Figure 3.1).

Phase I		**Phase II**	**Phase III**	
Analysis		Design and Development of the EPSS	Implementation	Evaluation
Performance Analysis	Cause Analysis			
October 2008				
	October 2008 – February 2009			
		March 2009 – September 2012		
			September 2012 – October 2012	
				October 2012 – November 2012

Figure 3. 1 Three main phases of the study

The analysis phase, as a first phase, consisted of two separate analysis steps in the study. The performance analysis was conducted to clarify CSI Unit's existing information to which the HPT initiative intends to contribute by reviewing organizational artifacts, documents and performance requirements. The performance analysis step took 2 weeks. Then, using Gilbert's BEM, the cause analysis was conducted to identify the contributing performance factors required for a successful improvement of the performers and also to explore the relationships between these issues and the organizational performance of the CSI Unit, as well as to prioritize the determined the root causes of the performance factors. The cause analysis step took 4 months (Figure 3.1.).

The EPSS as an intervention was designed and developed in the phase II. The technological infrastructure, content of the EPSS, and also components and structures of the system were designed and developed through this phase aligning with the data obtained from the first phase. Because the CSI Unit consists of seven sections and the logical sequence of job activities and work flow are interdependent, there was a necessity to design support structures for all sections separately. This explains why the most important part of our time of was allocated to this phase. To some extent, it seems normal because as McKay and Wager (2007) express that the design and development process of the large-scale, highly integrated EPSS for organizations require so much time.

Having been implemented, the evaluation of the EPSS was conducted to determine the overall impact, perceived benefits and effectiveness of the intervention for individuals, the CSI Unit and society in phase III. The evaluation was conducted thirty days after initial implementation of the system. The evaluation step took fifteen days.

In this study, data obtained from phase I and phase III constituted the results of the study. Moreover, details of phase II and research design of phase I and III are presented in the following sections.

3.4. Selected Research Methodology: Mixed Method Research Design

The research as a way of knowing and obtaining information on a topic or issue (Fraenkel, Wallen, & Hyun, 2012) is formed within the process of phases that require the collection, analysis and drawing conclusions of the data obtained through the research process. Therefore, the flow of the research requires researchers to engage the major steps in these phases. In other words, research methods that researchers propose for their studies involve the data collection, analysis and interpretation phases (Creswell, 2009). To serve that purpose, the researchers should select a design methodology based on the research problems and the questions addressing these problems, and decide which research designs, that is, quantitative, qualitative or mixed, would be used in the research process. In general, all methodologies, quantitative, qualitative or mixed methods, try to explain why questions (Pershing, 2006b).

The main purpose of this study includes both analyses of the organization and individuals, and evaluations of the proposed EPSS. Thus, the mixed method research design was used during the research study except for reviews of organizational artifacts and requirements conducted at the analysis phase. In that step, the CSI Unit's existing information and artifacts, as unobtrusive measures, to which the HPT initiative would intend to contribute was explored to being used for sequential phases as input data. As for the other phases, a sequential explanatory strategy (Figure 3.2) as a procedure of the mixed method design was used to explain and clarify quantitative results by collecting and interpreting follow-up of qualitative data (Creswell, 2009).

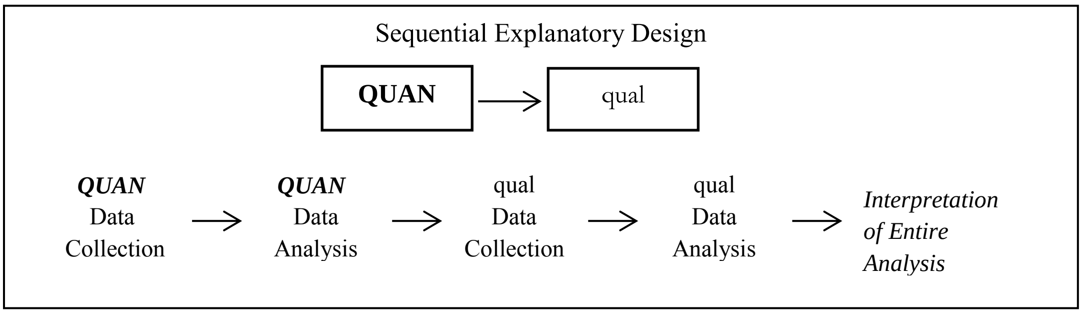


Figure 3. 2 Sequential Explanatory Design (Creswell, 2009, p.209)

Particularly, aligning with Gilbert's BEM, the cause analysis in Phase I began with a quantitative study that looked at the statistical relationship between causal performance factors determined by model and organizational performance. Following this analysis, the researcher scrutinized a qualitative study method to ascertain and to prioritize the root causes of performance issues determined by the previous step. Similarly, the first step for the evaluation of the EPSS began with a quantitative study in which Kirkpatrick's Four Levels and Kaufman's Mega Planning frameworks were tested, followed by qualitative methods entailing detailed exploration with individuals by interviews and other data collection methods.

The mixed-methods research combines the use of quantitative and qualitative methods together in a research study (Fraenkel et al., 2012). In HPT, mixed method research can be used as a research design to identify and to capture the complexity of an organization (Jayanti, 2011). Thus, quantitative and qualitative researches as different paradigms have been combined or mixed in contemporary practice by most of HPT practitioners (Pershing, 2006a). Moreover, as Pershing (2006b) hypothesizes that mixed or blended research design is the best approach to find answers or solutions to the organizational problems. To conclude, as Lundberg et al. (2010) recommends that a variety of data gathering methods and analysis tools should be used to understand current situations of the organizations. The advantage of using both quantitative and qualitative methods is that it enables researchers to find out issues in a systematic way (Dobrovolny & Fuentes, 2008).

3.5. Population and Sampling

While the group of units (e.g., people, artifacts, or settings) from which the information obtained in a research study is defined as a sample, the population covers a larger group of these units where the researchers try to employ the results obtained from the study (Fraenkel et al., 2012). The researchers make selections for the units of analysis defined as sampling with the object of increasing their capacity to answer research questions (Teddlie & Tashakkori, 2009).

The general population under study was police officers with different titles from the CSI Unit in Turkey. A total of 3396 CSI officers work in all 81 provinces and 342 districts. The researcher used a representative convenience and purposeful sampling strategies to determine the participants of the study. As Fraenkel et al. (2012) state that a certain group of people who are available for the research study is chosen as a convenience sample. In contrast to valuing participants' availability of the convenience sampling strategy, purposeful sampling is based on the premise that the researcher prefers to study with individuals from whom huge amounts of information can be gathered to discovering, understanding, and gaining insight (Merriam, 2009). In doing so, the scope or range of data which is disclosed through the study would expand (Lincoln & Guba, 1985).

Receiving official approval (Appendix K) from the Criminal Police Laboratories Department (CPLD), 3 metropolises (Ankara, Bursa, and Antalya) and 3 provinces (Kırıkkale, Isparta, and Balıkesir) were selected through a convenience sampling method to be representative of the population regarding to being a metropolis or a province, the crime rates, the number of police officers working at CSI sections, and workloads of the sections. The CSI officers from the selected metropolises and provinces formed the sample of the study. Information in the Table 3.1 depicts a number of CSI officers working at these provinces. Sampling and selection of the participants in this study are presented into two subheadings. While sampling for Phase I includes information about the selection of participants for the pilot study and qualitative data collection process, sampling for Phase III includes information on the process of selecting and sampling of the participants for both quantitative and qualitative data collection parts.

Table 3. 1

The number of CSI Officers (Sample)

Metropolises (M) or Provinces (P)	Number of CSI Officers (n)
Ankara (M)	149
Bursa (M)	142
Antalya (M)	103
Kırıkkale (P)	15
Isparta (P)	24
Balıkesir (P)	62
Total	495

3.5.1. Sampling for Phase I

Having conducted a performance analysis step, the first quantitative part of the study covered the entire population of the CSI Unit for cause analysis. In that study, 1176 CSI officers (34% of the population) participated from all the provinces and metropolises. The official letter was administered to the officers to fill out the survey. Regardless of being studied with samples, researchers would choose the entire population of concern to study in their researches (Fraenkel et al., 2012). Therefore, the researcher did not use any sampling strategy for this part. Apart from the first quantitative part of the study, the sample was selected from 3 metropolises and 3 provinces for the pilot study and qualitative data collection process. As for the pilot study, 315 CSI officers (9% of the total population) participated in the study from all sample metropolises and provinces. As more detailed, 96, 88, 66, 10, 15, and 40 CSI officers from Ankara, Bursa, Antalya, Kırıkkale, Isparta, and Balıkesir, were respectively, involved in the pilot study (Figure 3.3).

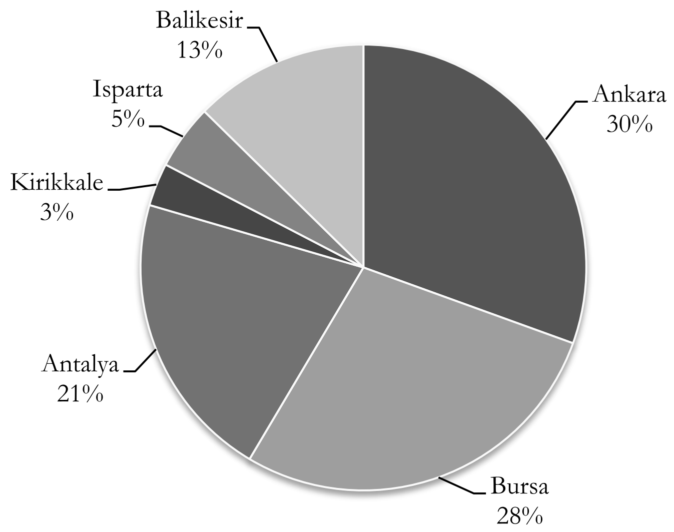


Figure 3. 3 Distribution of the CSI officers participated in the pilot study

As for the selection of the participants for the qualitative phase of the study in Phase I, the police officers were chosen through purposive sampling method. The criteria used for selection of the CSI officers were 1) having experience in CSI investigations and processes, 2) having worked as an investigator, an expert, an inspector or a chief at the CSI Unit, 3) having been actively involved in investigations or entire processes of criminal activities. The superintendent from the administrative section was helped the researcher determine the selection criteria. Totally, 22 CSI officers participated in the focus group interviews from all sample metropolises and provinces. As more detailed, 10, 3, 3, 2, 2, and 2 CSI officers from CSI Units located in Ankara, Bursa, Antalya, Kırıkkale, Isparta, and Balıkesir, were respectively, involved in the interviews. The demographic information of the participants is presented in Table 3.2.

Table 3. 2

Frequencies of CSI officers concerning their working sections in the CSI Unit and ranks.

CSI Sections	Ranks						
	Chief Superintendent 4th Degree	Superintendent	Chief Inspector	Inspector	Deputy Inspector	Police Officer	**Total**
Administrative section	2	5	2	1	2	-	12
Crime scene investigation section	-	-	-	-	-	3	3
Technical imaging section	-	-	-	-	-	1	1
Biometrical data processing section	-	-	-	-	-	2	2
Evidence preservation section	-	-	-	-	-	2	2
Laboratory section	-	-	-	-	-	2	2
Total	2	5	2	1	2	10	22

3.5.2. Sampling for Phase III

As opposed to Phase I, the sample was selected from only 3 metropolises (Ankara, Bursa, and Antalya) for both quantitative and qualitative data collection processes in Phase III. Because the main aim of the Phase III was to report the summative evaluation findings of an initial implementation to investigate the impact, effectiveness and perceived benefits of the EPSS, the researcher decided to select participants from metropolises where the intervention would be used more. To that purpose, 191 CSI officers from Ankara (n=60), Bursa (n=61) and Antalya (n=70) participated in the quantitative part of the study (Figure 3.4).

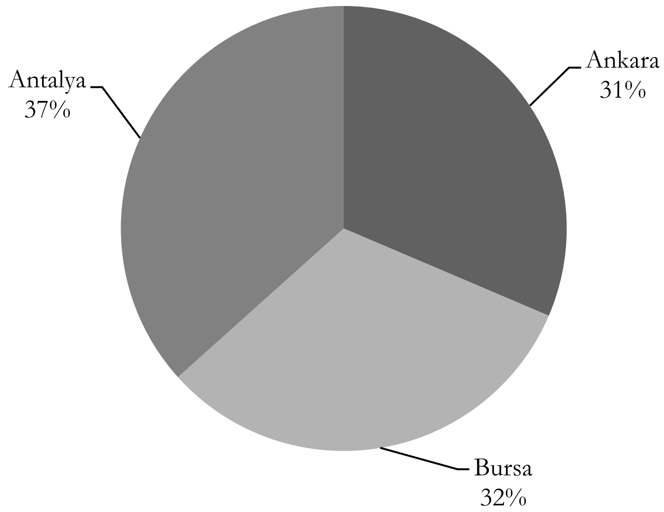


Figure 3. 4 Distribution of the CSI officers participated in quantitative study in Phase III

As for the selection of the participants for the qualitative phase of the study in Phase III, the CSI officers were chosen through purposive sampling method, similar to Phase I. The criteria used for selection of the CSI officers were 1) having experience in CSI investigations and processes, 2) having worked as an investigator, an expert, an inspector or a chief at the CSI Unit, 3) having been actively involved in investigations or entire processes of criminal activities. The superintendent from the administrative section was helped the researcher determine the selection criteria. The researcher conducted a qualitative study with 12 CSI officers from CSI Units located in Ankara (n=4), Bursa (n=4), and Antalya (n=4). The demographic information of the participants is presented in Table 3.3.

Table 3. 3

Frequencies of CSI officers concerning their working sections in the CSI Unit, ranks and years of experience in crime scene activities

CSI Sections	**Ranks**			**Years of experience**				**Total**
	Superintendent	Deputy Inspector	Police Officer	1-5	6-10	11-15	15-20	
Administrative section	1	2	-	-	1	2	-	3
Crime scene investigation section	-	-	2	-	2	-	-	2
Technical imaging section	-	-	1	-	-	1	-	1

Table 3.3 *Continued*

Biometrical data processing section	-	-	2	1	-	-	1	2
Laboratory section	-	-	2	1	1	-	-	2
Evidence preservation section	-	-	2	2	-	-	-	2
Total	1	2	9	4	4	3	1	12

3.6. Data collection methods and Instruments

Data collection is comprised of determination and selection of individuals for a research, receiving their permission to scrutinize with them and obtaining information with designed instruments (Creswell, 2012). Therefore, selection of data and data collection techniques are absolutely vital in that they help researchers develop understanding and discover insights related to research problems (Merriam, 2009). Observations, interviews, surveys and data reviews (existing information) can be used to identify the factors originating from human performance obstacles and to suggest solutions for engineering human competence and alleviating the current situation (Chyung, 2008; Enos, 2007). To serve that purpose, this study used following multiple data collection techniques in varying degrees in Phase I and Phase III: surveys, interviews, focus group interviews, documentation (organizational artifacts and computer logs), and checklist. Data collection methods and instruments used in the study are presented into two subheadings with reference to research design of the study.

More specifically, written questionnaires are the most preferred data collection method in HPT field, especially in conducting the analysis and evaluation of the performance-improvement efforts (Lee, 2006; Mulder, 1999). Indeed, written questionnaires as a data gathering method are the only method in some cases (Pershing, 2006c). Similarly, as Pershing (2006c) states that interviews can be used in the successive analysis and evaluation studies as either a single method or a conjunction with other methods. When using other data gathering methods, the aim is to correlate and validate information obtained through multiple methods (Pershing, 2006c). As for the focus group interviews, these are used to establish an optimum and to reach a consensus on investigated topics across organizations and geographic areas in performance analysis process (Rossett, 2009). So as to the data review, by virtue of its unobtrusive nature, it enables researchers to collect direct evidence of performance related information; therefore, it offers strong validity unlike other data collections methods such as surveys and interviews that are based on gathering performers' perceptions (Marrelli, 2010; Pershing, 2002).

3.6.1. Phase I - Analysis

Based on the HPT model, Phase I consisted of two essential steps: performance and cause analyses. The main aim of these processes was twofolded. Via the performance analysis, the researcher aimed to gain insights into the complete perspective about the CSI Unit via obtaining sufficient, informative and reliable information on all the CSI sections and officers. Therefore, the researcher reviewed official documentation to obtain background information about the CSI Unit. Secondly, in the cause analysis, the researcher intended to identify and prioritize causal performance factors by analyzing which of the six basic influences grouped under the two main categories on human behavior (environmental: data, instruments, incentives and repertory of behavior: knowledge, capacity, and motives) had an impact on the performance improvement of the CSI officers. To serve that purpose, the survey instrument was developed and administered to the whole population for identifying major factors based on Gilbert's BEM. Then focus group interviews were conducted to obtain in-depth information regarding determined factors and to specify sub-categories for prioritizing the causal performance factors.

3.6.1.1. Performance Analysis

Many names have been given to the review of products or documents as a data collection method in the HPT field. All the concepts of work samples, artifacts, extant data, existing information and intrinsic data include reviewing written documents such as reports, memos, products, course materials, routine work records, work processes, procedures or indicators. Using the document analysis name, Pershing (2002) states that these types of data collection methods encapsulate the analysis of any type of documents such as official sources of information or job aids for the purpose of obtaining facts (Pershing, 2002).

The researcher reviewed the CSI Unit's extant and intrinsic data including vision and mission statements, performance criteria, rules and regulations; and educational materials to select the right set of solutions or components of the interventions and to direct the evaluation strategy of the initiative. Particularly, the data obtained from this step provided sufficient input for both Phase II and Phase III. Information in Table 3.4 depicts the specific inputs offered and information on where and how these inputs were used through the study.

Table 3. 4

Reviewed extant and intrinsic data and their usage through study

Reviewed Data (as outputs)	Phases (as inputs)	Intended Use
Vision and mission statements	Phase III	Item generation for the instrument (evaluation of Level 4 and Level 5)
Performance criteria	Phase II	Design and development of the external component of the EPSS
Rules and regulations	Phase II	Design and development of the intrinsic component of the EPSS
Educational materials	Phase II	Design and development of the support structures for external and extrinsic components

3.6.1.2. Cause Analysis

Using Gilbert's BEM to support cause analysis methodologies, the researcher designed the data-gathering phase to include the survey and structured focus group interviews for collecting the data from CSI officers.

3.6.1.2.1. Quantitative Data Collection (Survey)

The researcher developed one survey to identify contributing causal performance factors required to be improved for the CSI officers. The main objective of the quantitative data collection process was to determine the variables responsible for the performance issues of the CSI Unit. Particularly, based on the Gilbert's BEM, the researcher aimed to finding out why the performance was as it was, and whether the possible causes that had an impact on organizational performance were due to the lack of environmental support or the lack of repertory of behaviors.

The survey instrument was developed in four sections; the first section was dedicated to obtaining demographics data of the participants, the second dedicated to measuring performance factors with regard to the environmental support, the third section was dedicated similarly to measuring performance factors as regards to the repertory of behaviors, and the final section was designed to measure organizational performance of the CSI Unit.

Measures regarding environmental support, the second section of the survey consisted of 25 items. The items of the survey were adapted from Ripley's (1998) Performance Environment Perception Scale (PEPS). The items which were congruent with the original format were arranged in a 7-point Likert-type response format, ranging from strongly disagree to strongly agree. Minor adaptations in wording and format of the items were necessary because the survey was developed for measurement within the context of the CSI Unit different from the original context.

Measures with regard to repertory of behaviors, the third section of the survey, comprised of 19 items. The survey items were constructed by the researcher with the guidance from a number of sources and researches uncovered in the literature. Similar to the second section's format, the items were arranged in a 7-point Likert-type response format, ranging from strongly disagree to strongly agree.

Organizational performance was measured in the final section of the survey consisting of 5 items. The items of the survey were adapted from Brewer and Selden (2000) and Kim (2005). To provide standardization of the survey instrument, the items were arranged in a 7-point Likert-type response format, ranging from strongly disagree to strongly agree. Although these two studies which were used for constructing the items were conducted for government organizations, minor adaptations in wording and format as in the second section of the instrument, were necessary due to the different context of the CSI Unit.

Having constructed the survey items in English; translation was required for the final version of the instrument. One bilingual instructional technologist expert translated the original versions of the instrument for the forward translation. The translated version of the instrument was modified by two experts, one whom was from the instructional technology field and the other, was from the measurement and evaluation field. After these processes, two experts from CSI Unit also checked and modified the instrument regarding intended meaning, common language and clarity of the items to be applied within the survey in the context of CSI Unit. Finally, the researcher confirmed the final version of the survey. Then, the instrument was constructed and validated by the researcher through a pilot study in order to structure the final version of the main study instrument (Appendix A).

3.6.1.2.2. Pilot Study

Once the validation was confirmed, a pilot study was carried out. As aforementioned, the instrument was administered to CSI officers from Ankara, Bursa, Antalya, Kırıkkale, Isparta and Balıkesir. 315 CSI officers participated in the study (Figure 3.3). The exploratory factor analysis using the principal component analysis was applied to construct a questionnaire for measuring underlying variables regarding contributing performance factors. The Kaiser-Meyer-Olkin measure of sampling adequacy was used to ensure the absolute sample size. The value 0.91, indicating superb value, pointed out that factor analysis was appropriate for these data (Field, 2005). Moreover, Bartlett's Test of Sphericity was significant ($p=.000$), ensuring that the factorability of the correlation matrix could be sustained with these data set.

Initial analysis also showed that the scree plot did not reveal a clean break; rather there were several breaking points on the plot. Moreover, the initial solution created three factors and also eigenvalues which overlapped each other. Thus, the items that spread across the many factors with a less than 0.1 eigenvalue were removed from the analysis, then the analysis was re-run for several times to obtain reliable factor solutions. Because a sample of 300 or more may provide a stable factor solution (Field, 2005) and the factor loadings should be greater than .298 for a sample size of 300 (Stevens, 1992, as cited in Field, 2005), minimum loading of 0.3 was used for determination of the significant variables loaded on each factor. Having completed the factor analysis, 19 items were deleted from the survey (Appendix B). The remaining twenty five items were categorized into three factors using a direct oblique rotation (direct oblimin).

A three-factor solution provided the most interpretable solution consistent with the data set. This solution accounted for 52.39 per cent of the variance; with loadings as depicted in Table 3.5. Cronbach's alpha was applied to the data to determine reliability of the entire scale. Coefficient alpha was 0.89 indicating a satisfactory level of reliability. Moreover, all three sub factors were also yielded a satisfactory level of reliability with 0.85, 0.90, and 0.82 coefficient values (Table 3.5). The emerged factors were further labeled. Basically, the researcher used Gilbert's BEM detailed in the literature review chapter to understand and name the factors. While the first factor (workplace) consisted of 12 items, the second (competency) and third (job value) factors were made up of 7 and 6 items, respectively.

Table 3. 5

Factors and items emerging from the factor analysis

	Entire Scale (α=.89)		
Items	**Factor 1: Workplace** (α=.85)	**Factor 2: Competency** (α=.90)	**Factor 3: Job value** (α=.82)
c18	,761		
c22	,690		
c15	,669		
c12	,658		
c17	,645		
c25	,588		
c23	,583		
c24	,566		
b10	,545		
c11	,428		
c14	,383		
c19	,344		
b13		,864	
b15		,847	
b19		,802	

Table 3.5 *Continued*

b17	,797	
b9	,760	
b11	,698	
b16	,657	
c9		,803
c16		,674
c3		,650
c8		,627
b3		,570
b8		,452

The final version of the instrument consisted of 25 items. The instrument was distributed to a population of 3396 CSI officers and completed via CPLD's intranet. The screenshots from the online version of the instrument were presented in Appendix C.

3.6.1.2.3. Qualitative Data Collection (Focus Group Interviews)

To obtain in-depth information regarding determined factors and to specify sub-categories for prioritizing the causal performance factors, a series of four focus groups were conducted with different ranks of CSI officers (n=22) following the survey. The researcher and three instructional technologists led discussions in four groups. The interviews lasted approximately 52 minutes. The instrument consisted of eight structured questions which were developed based on the survey results and determined factors. More specifically, the workplace and the competency factors as primary causal factors of the performance issues were used as a framework of the instrument. The instrument used for the focus groups was presented in Appendix D.

For this study, the focus group interviews were effective because all participants from different locations and ranks had a chance to generate a large amount of information regarding their performance factors. As Rossett (2009) states that the focus group interview is one of the most typical approaches to gather performance analysis data because, in general, it helps practitioners gather data from various individuals who may support different perspectives or locate different geographic regions or have different affiliations.

3.6.2. Phase III - Evaluation

Based on the HPT model, the evaluation phase is the final step of any performance initiative. After implementation of the EPSS, the evaluation phase was conducted to assess impact, effectiveness and perceived benefits of the EPSS. Congruent with sequential explanatory research design both quantitative and qualitative data collection techniques were applied to obtain required data for an evaluation. As for the quantitative data collection, the survey instrument was developed and administered to the CSI officers from 3 metropolises (Ankara, Bursa, and Antalya) 30 days after the implementation of the intervention. Moreover, computer logs recorded through the implementation period were also used to understand the functioning of the EPSS. Lastly, a checklist was developed to take two experts' opinion about the accuracy and completeness of the EPSS. After quantitative data collection parts, interviews were also conducted with CSI officers from the same metropolises to obtain in-depth information about the accomplishment of the EPSS.

3.6.2.1. Quantitative Data Collection (Survey, Computer Logs, Checklist)

The survey, computer logs and checklist were used as instruments for the evaluation phase. In this section, a short description of the measures is given.

3.6.2.1.1. Survey

The researcher designed and developed a survey instrument based on Kirkpatrick's Four Levels of Evaluation and Kaufman's Mega Planning level to assess the impact, effectiveness and the perceived benefits of the EPSS. Because the quantitative data were analyzed using only descriptive statistics rather than inferential statistics, a pilot study for the evaluation phase of the study was not carried out.

The survey instrument was developed with six sections; the first section was dedicated to remind CSI officers about the main EPSS levels (intrinsic, external and extrinsic) which had been used through implementation of the system. At the beginning of the survey, the names of the levels, a brief explanation of the levels, screenshots of the buttons which the CSI officers used to activate support structures whenever needed, and screen examples showing them the main pages of the support levels were presented. The second section was designed to obtain demographics data of the participants (gender, age and date of getting promoted). The third, fourth, fifth, and sixth sections were dedicated to measuring impact, effectiveness and perceived benefits of the EPSS. While the third, fourth and fifth sections were designed to be consistent with Kirkpatrick's Level 1, Level 2 and Level 3, the sixth section was designed to cover both Kirkpatrick's Level 4 and Kaufman's Level 5. The instrument was presented in Appendix E.

The survey items presented in the third (Level 1) and sixth (only for Level 4) sections were constructed by the researcher with the guidance of a number of sources and researches uncovered in the literature. Because the fourth (Level 2), fifth (Level 3) and sixth (only for Level 5) sections' evaluation required the researcher to assess successful implementation of the intervention components, and application and transfer behaviors of the CSI officers, these sections' items were written with regard to results obtained from performance analysis phase.

More specifically, measures regarding Level 1(Reaction) in the survey consisted of 10 items. While the first the 9 items were arranged in a 5-point Likert-type ranging from strongly disagree to strongly agree, the last item was designed as an open-ended question to obtain participants' suggestions regarding future improvements of the system. As aforementioned, the items were generated from previous researches presented in the literature that are consistent with the results obtained though the analysis phase.

Level 2 (Implementation) measures in the survey were designed to assess whether the EPSS components and levels had been effective and successful as planned. Therefore, participants were requested to evaluate the effectiveness of all four main support components (workflow interface, support portal, support panel and main portal) in a 5-point scale, ranging from none, little, some, much and very much.

As for measures regarding Level 3 (Behavior), this section included 11 items and that items were emerged from the survey used in the cause analysis phase. They were also arranged in a 5-point Likert-type ranging from strongly disagree to strongly agree.

The impact and perceived benefits of the EPSS on the CSI Unit was measured by 5 items in Level 4 (Results). As mentioned above, these items were generated with the guidance of a number of sources and researches uncovered in the literature that are consistent with the results obtained though the performance analysis step carried out in first phase. The items were arranged in a 5-point Likert-type ranging from strongly disagree to strongly agree.

Lastly, the impact of the EPSS on the society was measured by 4 items in Level 5 (Societal Benefit). Moreover, these items emerged from the results obtained through the performance analysis step which was conducted in first phase. The items were arranged in a 5-point Likert-type ranging from strongly disagree to strongly agree.

Having constructed the survey items in English; translation was required for the final version of the instrument. One bilingual instructional technologist expert translated the original versions of the instrument for the forward translation. The translated version of the instrument was modified by three experts, two of whom were from the instructional technology field and the other from the measurement and evaluation field. After these processes, two experts from the CSI Unit also checked and modified the instrument regarding intended meaning, common language and clarity of the items to be applied to the survey in the context of the CSI Unit. Finally, the researcher confirmed the final version of the survey. The instrument is presented in Appendix E.

3.6.2.1.2. Computer Logs

Throughout the implementation, tracking and logging data were stored and recorded on the external server. All activities, entries and searches executed by CSI officers were extracted from the server and merged into an excel data file to be used for statistical analysis. More specifically, officers' support structures preferences and used performance types such as extrinsic or external structures were recorded. Therefore, the data contained information regarding preferred support structures for both external and extrinsic levels. Based on the results of log statistics, the CSI officers' preferences relating to the usage of support structures embedded in the EPSS were revealed to support the data obtained from the survey which only depended on the users' judgments and opinions.

3.6.2.1.3. Checklist

The researcher used a checklist (Appendix F) adapted from Head (1999) to describe the EPSS's potential for usefulness. As a design evaluation, two experts from the instructional technology field reviewed the interfaces of the EPSS with an evaluation template in terms of three conceptual anchors: task support, usability and aesthetics. The checklist consisted of 50 items, and the researcher requested from the experts to assess existing interfaces of the system from a users' point of view by commenting the items designed for different focuses. While 15 items measured the task support concept, the usability and aesthetics concepts measured with 17 and 18 items, respectively. The data obtained from the checklist was valuable to test the system's effectiveness and usefulness and it was used to compare user's feedback to revisions.

3.6.2.2. Qualitative Data Collection (Interviews)

After the quantitative data collection phase of the evaluation part, the researcher conducted interviews with different ranks of CSI officers (n=12) to obtain in-depth information on the impact, effectiveness and perceived benefits of the EPSS. The interviews lasted approximately 25 minutes. The interviews consisted of 9 structured questions which were developed based on the results obtained from the quantitative data collection phase. The instrument used for interviews is presented in Appendix G.

3.7. Data Analysis

The analysis and interpretation of the data require researchers to draw conclusions, summarize data via tables, figures, and pictures, and clarify the consequences (Creswell, 2012). In this study, many data were obtained from various data collection tools with different time phases. Therefore, the data analysis process began with the collection of data for all phases in order to draw conclusions by answering the research questions.

The first research question of the study investigated the organizational artifacts which the HPT initiative is intended to contribute to. To serve that purpose, the value of CSI Unit's existing information was tried to be revealed by reviewing vision, mission, performance criteria, workflow processes and intrinsic data of the CSI Unit. To be able to see the whole picture of the organization's requirements and existing information for performance improvement initiative, these reviewed written official documents and results were presented in narrative formats with numbers whenever required for the purpose of obtaining facts and current situation of the CSI Unit. As aforementioned, the main aim of the research question was to understand and clarify the organization's satisfaction of carrying out the performance improvement initiative.

The second research question of the study explored the contributing causal performance factors required to be improved. As aforementioned, a mixed data approach was used to gather and analyze quantitative and qualitative data for this phase. For this aim, firstly, the researcher developed an instrument and pilot data gathered via this instrument. Based on the findings, factor model was developed based on the factor analysis and named as workplace, competency, and job value. Firstly, the demographic information of the participants was reported in terms of frequencies and percentages. Then a three-factor solution was tested with confirmatory factory analysis, using the analyses of moment structures (AMOS) version 4 statistical software package, for determining the best factor structure of the instrument. The main aim of the confirmatory factor analysis in this phase was to determine whether the factor structure obtained using exploratory factor analysis could be confirmed.

After this analysis procedure, a multiple regression analysis was performed to understand how well these three performance factors were able to predict the perceived organizational performance of the CSI Unit. In order to check one of the assumptions of the multiple regression referring to the relationship among the independent variables, multicollonearity, the correlation between each independent variable was checked. In this case, the correlations were .48, .45, and .64 which were less than .7; therefore, all variables would be retained (Pallant, 2001; Tabachnick & Fidell, 2007). Moreover, both of the scales (workplace, competency, and job value) correlated substantially with the organizational performance variable (.73, .48, and .40 respectively). Moreover, the researcher also checked the Tolerance values of the variables which should be very low (near 0) not to suggest the possibility of the multicollinearity and singularity. In this case, the values for the three independent variables were quite respectable (.73, .54, and .55 respectively). To conclude, it was possible to assert that the assumptions were not violated. Apart from multicollinearity and singularity, outliers, normality, linearity, homoscedasticity, and independence of residuals assumptions were also checked with residuals scatterplot and normal probability plot (Appendix H). The scatterplot showed some outliers in the solution and some of them exceeded 3.29. As Pallant (2001) notes that it is common to find a number of outlying residuals with large samples. Therefore, it was not taken any action. Moreover, the residuals had a reasonably straight-line relationship with dependent variable scores. Therefore, the researcher concluded that the assumptions for the multiple regression were not violated in this case.

As to the qualitative part of this phase, the main purpose of the qualitative approach was to prioritize determined performance factors and specified subcategories of these variables. Therefore, the data collected by focus group interviews were transcribed to a Word Processor and segmented in terms of workplace and competency (main themes) determined as a result of the regression analysis. Then, the subcategories were grouped under two main themes so that the codes obtained from the qualitative data collection approach would be changed into quantitative data to be reported quantitatively. During this period, transcribed data was read for many times to comprehend the general framework of Gilbert's BEM. A content analysis technique was used while analyzing the data. In doing so, the transcribed data were analyzed qualitatively for recurring patterns of meaning and the analysis centered on displaying the frequencies (Merriam, 2009). In the presentation of the results of this phase, the fishbone diagram was designed to classify the primary performance factors and also identified and prioritized categories and subcategories were explained with several direct quotations.

The third research question of the study investigated the impact, effectiveness and perceived benefits of the EPSS on the performance of CSI officers based on Kirkpatrick's Four Levels Model and Kaufman's Mega Planning framework. As aforementioned, a mixed data approach was used to gather and analyze quantitative and qualitative data for this phase. Quantitative data were analyzed using descriptive statistical measures to present general findings of the summative evaluation in five main categories, reaction, implementation, behavior, results, and societal benefits, all consistent with Kirkpatrick's Four Levels Model and Kaufman's Mega Planning framework. The demographic information of the participants was reported in terms of frequencies and percentages. Moreover, mean scores and standard deviations were calculated and reported for each item with regard to research framework. Open-ended questions and checklist results were also analyzed quantitatively and identified issues regarding feedback on the current system were reported for improvement of the intervention. Because the main objective of the qualitative data collection approach in this phase was to obtain in-depth information about the evaluation of the EPSS, the data collected by interviews were first transcribed to a Word Processor and segmented in terms of five main categories, reaction, implementation, behavior, results, and societal benefits. As for the analysis of the data, the content analysis approach was used; therefore, having identified the subcategories, the frequency of their occurrences based on the recurring patterns of meaning in the data were presented and linked with five main categories (Merriam, 2009). In other words, the subcategories were grouped under these main themes so that codes obtained from qualitative data collection approach would be changed into quantitative data to be reported quantitatively. As Kirkpatrick (1994) supports the idea that the best method for interviews in a four-level evaluation is to use a patterned interview in which the same questions are asked to the participants. And also, data can be tabulated for giving the results quantitatively in behavior change. During this period, transcribed data were read for many times to comprehend the general framework of Kirkpatrick's four levels and Kaufman's mega planning. In the presentation of the results of this phase, the evaluation results were explained with several direct quotations.

As a conclusion, summarized information about research questions, data collection methods, instruments and data analysis format were presented in Table 3.6.

Table 3. 6

Summary of HPT models, research questions, data collection procedures, sample size, instruments and data analysis

Phases	**I**			**II**	**III**	
	Performance analysis	**Cause analysis**		**Design and development**	**Evaluation**	
Models and frameworks	-	Gilbert's Behavior Engineering Model		-	Kirkpatrick's Four Levels of Evaluation and Kaufman's Mega Planning	
Research questions	What is the value of the CSI Unit's existing information to which the HPT initiative intends to contribute?	What are the root causes of the performance factors required to be improved to meet the goal of efficient and effective forensic services and activities offered by CSI sections?			Does the EPSS intervention as a performance improvement initiative achieve the impact, effectiveness and perceived benefits expected on individual and organizational performance?	
Data collection	Data review	Quantitative	Qualitative	Design and development of the EPSS	Quantitative	Qualitative
Sample size	4 official artifacts	1176	22		191	12
Instruments	-	Survey	Focus group interviews		Survey, computer logs, checklist	Interviews
Data analysis	Narratives and frequencies	Descriptive statistics, confirmatory factor analysis, multiple regression	Document analysis (Frequencies and quotations)		Descriptive statistics	Document analysis (Frequencies and quotations)

3.8.Validity and Reliability

In applied fields, generating ethically valid and reliable knowledge is one of the important considerations for all researches (Merriam, 2009). In that sense, the researcher applied to Human Subjects Ethics Committee to get an official paper indicating that human rights were not violated within the study. Official permissions and committee's report were presented in Appendix J. Moreover, the researcher applied to the General Directorate of the TNP and CPLD to receive permission for the research study. The official letter including the permission given from the TNP and CPLD was presented in Appendix K.

Similar to other designs, checking the validity of both the quantitative data and the accuracy of the qualitative findings are vital for mixed method researches (Creswell, 2009). The strategies and procedures employed in the study for producing reliable research results were presented separately in two sections for quantitative and qualitative (trustworthiness) stages of the study.

3.8.1. Validity and reliability for quantitative parts of the study

In the study, validity threats and coping strategies for quantitative parts of the study were presented and discussed in three types of validity as Fraenkel et al. (2012) proposed. While the first validity explanation refers to the instrument (or measurement), the other type of validity, termed as internal validity, deals with the premise that whether research findings match with reality in the study (Merriam, 2009). The last validity type, named as external validity, addresses the issues regarding generalizability of the study.

3.8.1.1. Instrument validity

Fraenkel et al. (2012) discussed the instrument validity in three different approaches, content-related, criterion-related, and construct-related evidences of validity. Firstly, the content-related evidence validity deals with the content and format of the instrument (Fraenkel et al., 2012). The format and content designs of the instruments were developed with experts. Indeed, all instruments used in the study were checked and judged by experts from the instructional technology and measurement and evaluation field. Moreover, experts and chiefs form the CSI Unit also checked and modified the instruments regarding intended meaning, common language and clarity of the items to be applied to the survey in the context of CSI Unit. As a conclusion, all the items and questions in the instruments were approved that instruments' format and content were appropriate and adequate to be used in the research study. As for the criterion-related evidence validity, external criteria as other assessment procedures were validated by different data collection tools and approaches. Selection of the mixed method design helped the researcher to apply strategies for maintaining the validity. More specifically, in the evaluation phase, perceived-benefits of the EPSS scores tried to be validated with computer logs showing the exact preferences of the officers. Similarly, as Fraenkel et al. (2012) suggest, the focus group interviews were conducted followed by administering the survey in the cause analysis phase to measure same variables with different perspectives. Lastly, construct-related evidence of validity as the broadest of the three categories of evidence for validity involves considering different types of evidence (Fraenkel et al., 2012). It embodies not only the variable's clear definition but also theories underlying the variable and logical and scientific investigations. To obtain construct-related evidence of validity, the variables were defined with regard to the main HPT models such as Gilbert BEM's, Kirkpatrick's Four Levels, and Kaufman' s Mega Planning. The instruments used in the study were developed from a main body of the previous literature so that the variables and all constructs could be defined clearly. Moreover, all constructions in the research design were tested both logically and empirically. To illustrate, the researcher applied factor analysis to the pilot study to develop the study instrument for the first phase of the study, and then confirmatory factor analysis was also conducted to maintain the construct-related evidence of validity.

3.8.1.2. Internal validity

As Merriam (2009) indicates that the question of how findings match reality is the major concern of the internal validity. Apart from controlled factors, alternative explanations, labeled as threats to internal validity, might exist and explain the outcomes of any study (Fraenkel et al., 2012). Therefore, researchers should try to use some techniques for controlling threats to internal validity in their studies. In this study, the researcher was aware of these threats and developed coping strategies for them. Subject characteristics such as mortality, location, instrumentation, history, and subject attitude were considered as possible threats of the internal validity in this study. To cope with subject characteristics like mortality and location threats, the researcher selected a sample of CSI officers from different provinces and metropolises and tried to obtain more information on subjects with different ranks. Moreover, a mixed method research design and different data collection tools were selected for the study to eliminate effects of instrumentation, history and subject attitude threats. Especially, sequential explanatory design required the researcher to collect qualitative data following by surveys to obtain more information on details in both cause analysis and evaluation phases. More specifically, conducting focus group interviews in the first phase were very purposeful to eliminate history and subject characteristics threats.

3.8.1.3. External validity

The external validity of the research can be determined by the extent to which the research findings of the study could be generalized (Fraenkel et al., 2012; Lewis & Ritchie, 2003; Lincoln & Guba, 1985). To represent the population of interest, the researcher conducted and administered a survey to the whole population in the first phase and reached 34% of the population. With the same objective, the researcher reached 5% of the population who used and evaluated the intervention in the second survey. To obtain a representative sample, convenience and purposeful sampling strategies were also used in the qualitative parts of the research. To overcome validity issues, the researcher selected CSI officers and experts from both provinces and metropolises and these selections were based on some criteria mentioned in sampling sections.

3.8.1.4. Reliability

Fraenkel et al. (2012) define reliability as the consistency of the scores obtained from the research instruments. To check on the internal consistency of the instruments, Cronbach's alpha was calculated for each instrument. Coefficient alpha was 0.92 indicating a satisfactory level of reliability for the first survey. Moreover, all three sub factors were also yielded a satisfactory level of reliability with 0.92, 0.87, and 0.78 for competency, workplace, and job value factors, respectively. As for the second survey, conducted in phase III, Coefficient alpha was 0.93 for the entire scale specifying a satisfactory level of reliability.

3.8.2. Trustworthiness

Despite the lengthy history of the qualitative research, namely the concepts regarding establishment of the authenticity and trustworthiness of the studies has varied between writers and researchers owing to their different assumptions about reality and philosophical perspectives (Merriam, 2009). In Lincoln and Guba's (1985) view, trustworthiness in qualitative research encompasses internal and external validity, reliability and objectivity. By virtue of this approach that has been become a widespread in the qualitative paradigm (Merriam, 2009), the researchers should use some techniques to meet trustworthiness criteria in their studies. As Lincoln and Guba (1985) advocate that four criteria should be used to establish trustworthiness: (a) credibility, (b) transferability, (c) dependability, and (d) conformability. These four criteria served as a basis for establishing trustworthiness for this study.

As for credibility, prolonged engagement, persistent observation, different modes of triangulation, and member checking strategies were used to enhance the possibility that findings would be considered credible. First and foremost, the researcher as a member of the performance improvement project demonstrated a prolonged period of engagement to learn the culture of the CSI Unit. Moreover, the researcher also provided evidence of persistent observation to reveal contributing performance factors and assess the intervention in detail. Apart from these, multiple methods of data collection such as interviews and document reviews; and multiple sources of data for comparison and cross-checking were gathered in the related phases of the research. Lastly, as an official requirement of the performance improvement project, all findings and conclusions were shared and tested with high-ranking stakeholders and officers of the CSI Unit for establishing credibility of the data.

The researcher tried to use two techniques to meet the transferability criterion. Firstly, sufficient and detailed information regarding the CSI Unit and workflow of the sections were presented in the study. Moreover, adequate evidence concerning analysis of the Unit and evaluation of the EPSS were supported in the study by giving quotations from participant interviews. Apart from thick description of the setting and evaluation process, the researcher selected the study sample with convenience and purposeful sampling strategies to enhance the possibility of generalizing the results of the research.

Descriptions of the data collection and decision processes were presented in detail to meet the dependability criterion of the study. Moreover, different modes of triangulation strategies were used, as aforementioned, for establishing both replication of the entire research and confirmability of the study.

3.9. Limitation of the Study

The study has theoretical and methodological limitations. First and foremost, theoretical limitations of the study could be discussed in terms of theoretical and philosophical tenets of the HPT field. Although the research process followed the flow of the HPT model, the researcher could be not involved in some steps and phases of the model with the main structure of the research. To illustrate, the gap analysis could not be performed because the performance improvement initiative was the first effort for the CSI Unit; therefore, it was not possible to indicate the actual state of the workforce performance of the organization to be compared to desired level. Lee and Owens (2004) recommend that researchers should collect as much information as they can about their purposes only if there are no data available about the previous solution efforts or initiatives. Similarly, intervention implementation and change management phases could not be integrated into the research process. Lack of time was the main restraint on the integration of this phase into the research design. After the initial implementation of the EPSS, the evaluation of the system was conducted instead of investigating the change management, employee development or process consulting outcomes. Similar inclination was preferred in the evaluation phase. Although Kirkpatrick's model is an example of level-based evaluation model designed for training interventions, there should be a required time interval between evaluation levels, most notably level 3 and level 4. However, there is still no standard for conducting levels of evaluation for non-instructional interventions (Marker et al., 2006). By virtue of time constraints, summative evaluation of the EPSS based on the four level of evaluation and mega planning was conducted in the same period of time. The changes required to be assessed in the evaluation of level 3 and level 4 were evaluated in terms of perceived perceptions of the CSI officers.

One other theoretical constraint with the study was that a comparison between technologies, personal digital assistant (PDA) and computers, could not be made regarding which support structures and levels were preferred by CSI officers. As mentioned in the intervention section, limited support structures were designed and developed for PDAs owing to a limited screen size of the equipment. Therefore, it was not possible to compare technological superiority and performance between these technologies.

As for methodological limitations, the data obtained through research processes depended on mainly perceptions of the CSI officers. Direct measures of performance facts could not be obtained because of two reasons. The researcher encountered the first reason at the phase I. Because the study was a first initiative for the CSI Unit, there were no official and statistical data to be used regarding performance issues and factors for the work related performance. Therefore, determination of the performance factors depended only on the perceptions of the participants by collecting quantitatively and qualitatively data. Secondly, hard performance data could not be obtained at the final phase of the study because of the time constraint. Although computer logs obtained from participants' preferences used to assess support structures of the EPSS, the evaluation data gathered through study relied on the perceptions of the CSI officers. The main limitation of the perceptions of performance is that people's individual performance and what they feel or believe may not be related directly (Swanson & Holton, 1999). Moreover, the data obtained from perceptions cannot be independently verified. Therefore, if possible, direct measures of performance (facts) should be obtained when the aim is to understand whether organization is performed better as a consequence of the intervention (Rothwell, 1996; Swanson & Holton, 1999). Regardless of their shortfalls, perceptions of the people to any situation are also valuable to understand what is happening in organization (Rothwell, 1996, 2005).

The second methodological limitation was that the mean of the items in the first survey were unexpectedly higher than they were expected (Appendix L). Although the best factor structure of the instrument was obtained with confirmatory factory analysis, the researcher decided to change the research design of the study. A sequential explanatory research design was employed after obtaining this unexpected result. This change was purposefully valid as Morse (1991) points out that a sequential explanatory research design is valuable when quantitative study leads to unexpected results. In that situation, qualitative data as a follow-up phase provide researchers to analyze and interpret these unexpected results in more detail (Creswell, 2009).

Another methodological limitation was that observations as qualitative data collection tool could not be used in the study. It might be concluded that valuable information about the employee, the job and the work environment can be obtained through observation methods. By systematically watching employees when they perform their job tasks, observation methods can give data impossible to obtain through other data collection methods in terms of documenting and analyzing their behaviors (Marrelli, 2010). Because of the security and confidential reasons, it was not possible to observe CSI officers analyzing crime scene, or conducting critical analyses with collected evidence. The same limitation was also valid for the evaluation phase where qualitative data was collected without any observation.

3.10. The Intervention (EPSS)

The purpose of the integrated EPSS is to provide performance support for the CSI officers with components which integrate a number of different aspects on the CSI Unit. The system combines work processes and performance support mechanism for guiding officers through the specific outcomes required from them to complete the crime scene activities. This performance support is provided in order to both enhance officers' skills and knowledge and eliminate environmental performance issues.

The system is designed to accommodate the needs of the entire population of the CSI Unit. Therefore, throughout the EPSS, information was presented in the jargon of the CSI officers. To serve that purpose, the content of the support structures (help contents) are derived from the educational materials that are used for their in-service training. The large-scale, highly integrated EPSS is mounted on an intranet server so that information can move much faster. The CSI officers can access the job-related information and resources with multiple paths embedded in the system at the moment of the need to enable performance.

An integrated EPSS is employed in both computers for the CSI officers from all CSI sections and PDAs for officers working only at the crime scene investigation section. This difference results from the fact that the officers from crime scene investigation sections have to collect evidence and fulfill some official procedures with regard to the investigation they conduct. Therefore, their performance support mechanism (especially for extrinsic and intrinsic supports) should be designed differently from the other sections' officers. Another determinant for this difference is that officers from this section use PDAs while conducting investigations. The presentation of the support contents should be displayed differently from computers located in the sections. Owing to the constraints of PDAs' screen size; only one support structure is embedded as an extrinsic support in the PDAs. More information and sample screenshots are given in the next subheadings. The same approach is also valid for intrinsic performance support. Because the main workplace and used technology (PDAs) are different for the crime scene investigation section, their intrinsic support should be designed and developed differently from other sections. More information about intrinsic support for this section is given in the next subheading.

Moreover, the integrated EPSS in coherence with three EPSS types also consisted of four different components: (1) workflow interface, (2) support portal, (3) support panel, and (4) main portal. To provide them to access different representation of the help contents embedded in both support portal and support panel, six main support structures (educational materials, visual, information cards, process maps, wizards and assistants, coaches and checklists, tips, and frequently asked questions) were integrated to the system.

In sum, the integrated EPSS offers a justifiable set of performance solutions by providing a work-flow based interface with context-specific access to support structures, tracking the job specific and performance related information, and the process support in the context of the workflow. Covering all these, the system consists of three levels of performance support as offered in the literature: (1) intrinsic, (2) extrinsic, and (3) external performance support systems. Taking root causes of performance factors obtained from both performance and cause analysis phases into account, three levels of performance support (intrinsic, extrinsic, and external) were designed and developed. An intrinsic support was delivered via a workflow interface application providing process support, attaining support structures, and monitoring the jobs' specific performance related information. Because the root causes of the performance factors required to be improved to meet the goal of efficient and effective forensic services and activities were related with workplace and competency issues, the extrinsic and external support was also integrated to the main system.

3.10.1. Intrinsic Performance Support System

An EPSS represents task structuring characteristics of the organization via work processes and procedures with the intrinsic performance support system. In that sense, workflow application interface [Iş Akış Arayüzü] embedded in the integrated EPSS simplifies procedures that CSI officers follow regularly so as to do their job. In doing so, the interface that serves the whole system and the performance support performs as one system. In that sense, the intrinsic nature of the system behaves actually part of the job routine and uses the information to apply appropriate rules designed based on the work flow and the actual job context of the all CSI sections. That is to say, the EPSS and work tasks are integrated so that the CSI officers are supported in the format and that logical sequence of job activities or work flow can be easily followed to automate tasks. Powerful intrinsic nature of the support component incorporates data generated by officers and progresses officers achieve through the job tasks.

As aforementioned, the intrinsic support system is designed and developed differently for the crime scene investigation section. Although the officers from that unit have a chance to use other performance support structures (extrinsic and external supports) while they are using computers at the office, the intrinsic performance support (workflow application interface) should encompass workflow structures while they are investigating the crime scene. Figure 3.5 displays a demonstration of an interface as an intrinsic support system developed for the crime scene investigation section. Like in the other CSI sections where the workplace application interface is embedded in the computers, the main purpose of the intrinsic support for the crime scene investigation section is to guide officers through the process of collecting evidence and fulfill other official procedures and requirements such as generating crime scene reports.

Figure 3. 5 The Intrinsic performance support interface for Crime Scene Investigation Section

Apart from the crime scene investigation section, the intrinsic performance support is employed in computers to support other CSI sections. The workflow interfaces are designed and developed differently for all CSI sections with regard to requirements and procedures of the workflow followed for the job tasks. Figure 3.6 displays an interface as an intrinsic support system developed for biometrical data processing section.

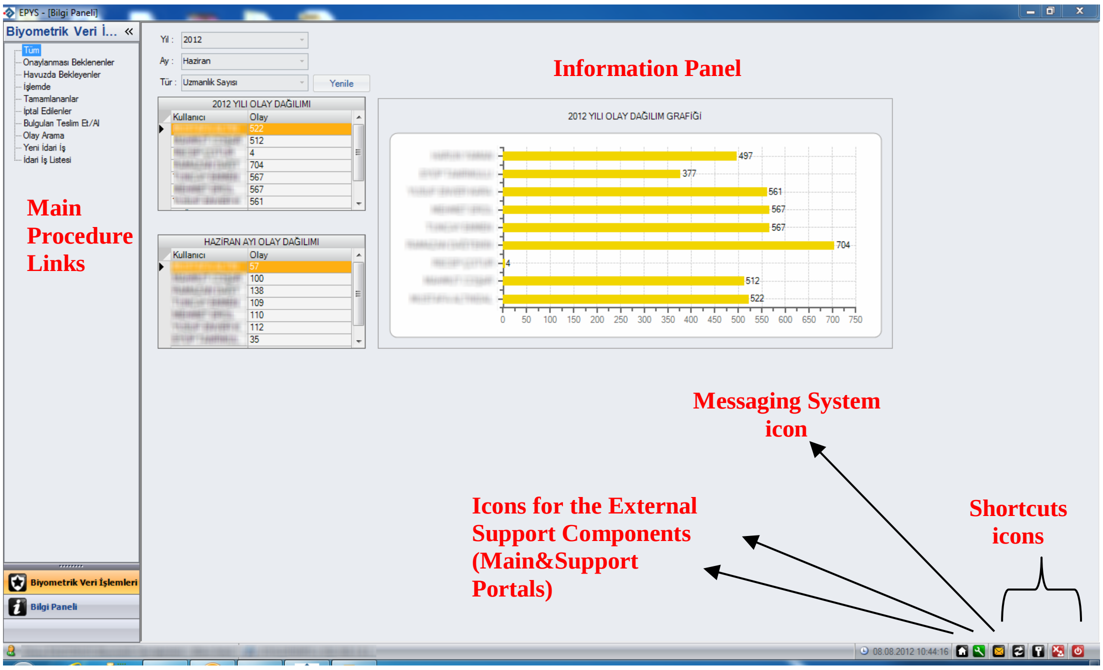


Figure 3. 6 A sample screenshot of workflow application interface for biometrical processing section

All components of the EPSS are integrated into an interface that helps CIS officers reach support components and access the information regarding their job task whenever they need it. Using small icons inserted in the right lower position of the interface, the CSI officers can easily access external performance support components (Figure 3.6). To simplify other requisite tasks such as switching users or closing the system, shortcut icons are also embedded in the main page of the interface. The main procedure links enable officers to access previous job tasks, new job tasks, and other possible important archives.

Moreover, synchronizing with work processes, the system monitors what CSI officers are doing and what they have done with the information panel (Figure 3.6). In doing so, as aforementioned, individuals from any section can monitor their performance in numerical formats. Besides this opportunity, real time communication via a messaging system is also embedded in the interface so that officers can interact with their colleagues from different CSI sections to track specific job related documents, reports or evidences. Whenever the officers receive a message from other sections, users are informed by a notice.

In addition to links embedded in the main page of the interface, an intrinsic nature of the system behaves actually part of the job routine; therefore, the CSI officers are supported to fulfill the requirements of the job tasks. In that sense, work flow and required procedures are selected as the baseline so that the CSI officers can perform their job tasks using the intrinsic nature of the EPSS without interruption. Figure 3.7 displays a demonstration of an interface developed for the laboratory section which includes some major tasks officers must do in their job routine.

Figure 3. 7 A sample screenshot of workflow application interface for laboratory section

3.10.2. Extrinsic Performance Support System

The extrinsic performance support system is designed and developed for CSI officers to get performance support while they are performing their job tasks. Unlike intrinsic performance support with which the officers progress through job tasks without any interruption, they have to activate and turn on the support mechanism in the extrinsic support. That is to say, alternative views of the support structures in extrinsic support are loosely integrated into the workflow application interface. On-demand access to support structures in extrinsic support runs in a browser. Whenever needed, the extrinsic support can be invoked intentionally by the CSI officers and can be closed, too. Help buttons in the form of a question mark are embedded throughout the interface.

Extrinsic support is accessed easily and quickly by clicking “?” button that appears on the interface screen. A help button, “?”, was located in the screen indicating that the user can get a performance support regarding the job task dealt with. When clicked, a popup window opens. Then support information associated with the job task are displayed automatically to the performers with list of support structures in the "support panel" [Destek Paneli]. Figure 3.8 displays a demonstration of the extrinsic performance support developed for the laboratory section in case of providing a performance support regarding the selection of the investigation method, super glue.

Figure 3. 8 A sample screenshot of support panel

Extrinsic performance support system consists of six main support structures. When CSI officers want to get performance support via the extrinsic support system and turn in the support panel by clicking the help button, available support structures are enabled so that they can select appropriate structures. The support structures are termed with regard to Gery's (1995) framework. Table 3.7 depicts support structures, screenshots of the structures used in the extrinsic support, and corresponding frameworks constructed by Gery (1995). Contrary to Gery's (1995) classification, Frequently Asked Questions are added to the support structures' list.

Table 3. 7

Extrinsic support structures in the EPSS

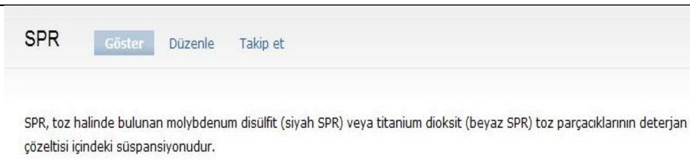
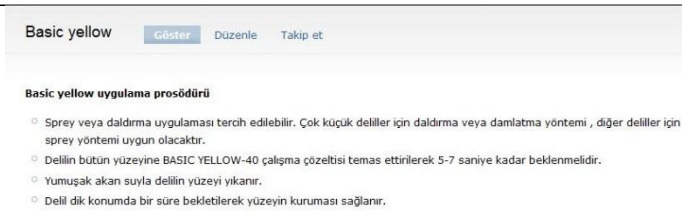
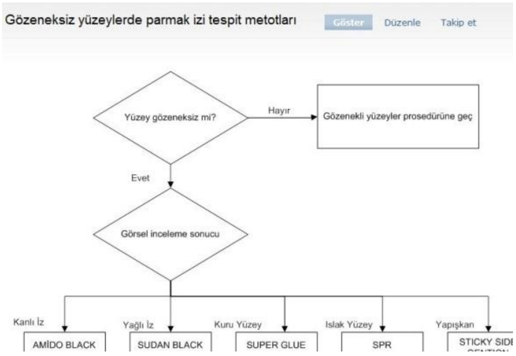
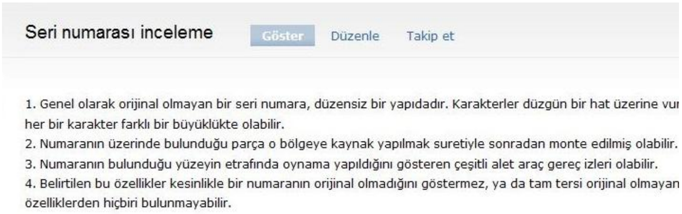
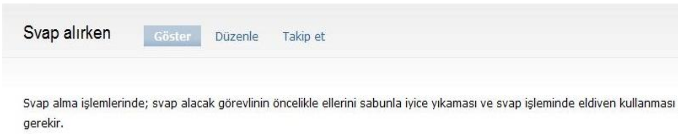
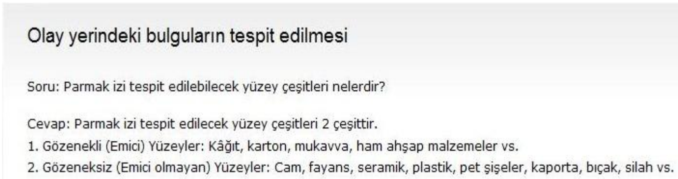
Support Structures	**Screenshots**	**Gery's (1995) classification**
Information Cards **[BILGI KARTLARI]**		Cue Cards

Table 3.7 *Continued*

Process Maps **[SÜREÇ HARITALARI]**		Explanations or Demonstrations
Wizards and Assistants **[SIHIRBAZ ve ASISTANLAR]**		Wizards Assistants or Helpers
Coaches and Checklists **[REHBER ve KONTROL LISTELERI]**		Coaches or Guides
Tips **[IPUCU]**		Tips
Frequently Asked Questions **[SIKÇA SORULAN SORULAR]**		-

Like the intrinsic support, the extrinsic performance support is designed and developed differently for the crime scene investigation section. Because of the screen size limitations of the PDAs and time restrictions (the crime scene should be investigated as soon as possible), only information cards as support components are provided for them. When they click the help button on the screen, the extrinsic support content is provided to them with only information cards. Regardless of the CSI section the officers work at, any support structures can be requested on how to complete a job task. Whenever invoked, the support panel is opened, and all available support structures for the job task are listed through the new window. A performer can request and display help content in different forms of the structures. When the officers finish reading the contents, the support panel should be turned off so that the performers can continue to perform their job task for which performance support is needed.

Whenever performers in the extrinsic support system click the "?" button to reach the support content, the performers' location, preferences relating to support structures and time of access are recorded.

3.10.3. External Performance Support System

When performers use the system and have a question or need information about job tasks, they can access the external support component to gain required information instantaneously. In doing so, CSI officers have to leave the workspace to get performance support. To provide external support to the officers, two elemental components are developed. While the "support portal" [Destek Portali] (Figure 3.9) is designed and developed to provide help contents, the "main portal" [Ana Portal] (Figure 3.10) serves the documentation (short history of the CSI Unit, organization schema, mission, vision, regulations, user manuals, and important links), asynchronous communication among the officers from different locations, and links to the support portal. To easily access to the external support components, the shortcut buttons are inserted on the workflow application interface for all CSI sections (Figure 3.6).

Figure 3. 9 External performance support: Support portal

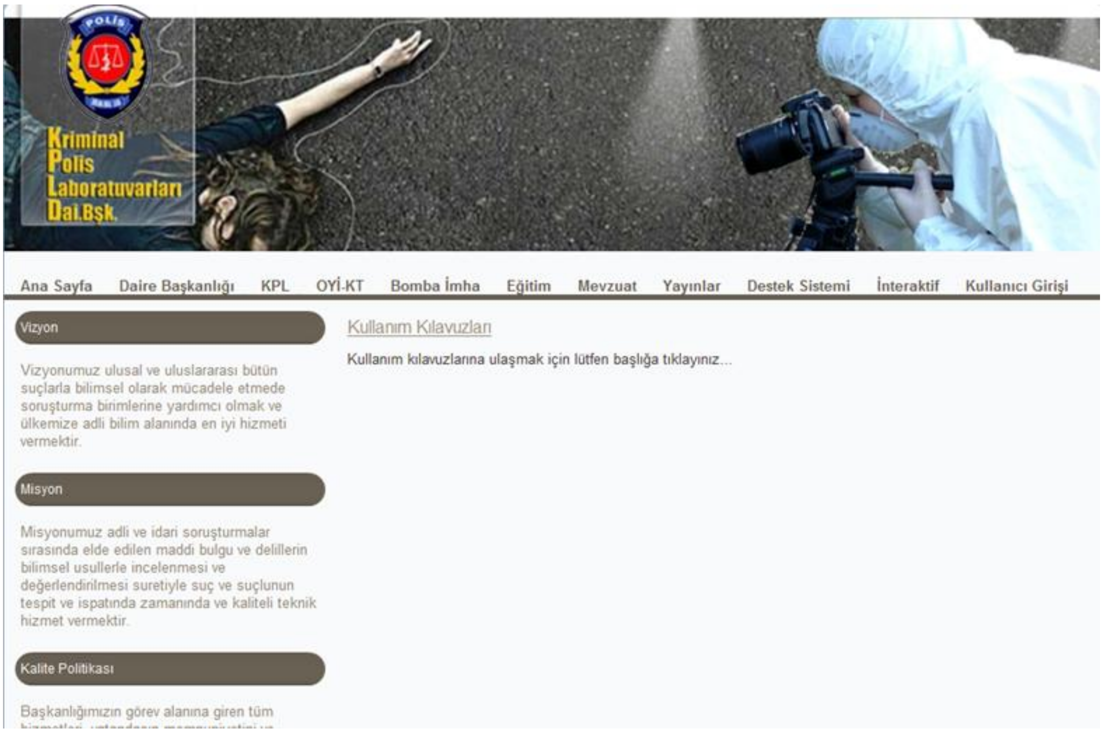


Figure 3. 10 External performance support: Main portal

Besides the workflow application interface, CSI officers can also access the support portal quickly and easily by clicking the button appeared in the list of support structures presented on the support panel while performers use the extrinsic support (Figure 3.8).

In the support portal, linked to an extensive database, the officers can access all or some of the help contents with following some hyperlinks. These hyperlinks are organized with reference to CSI sections and performance criteria relating to the selected section. In case the CSI officers from all CSI sections find help contents related to the job task, they will follow the sequence of hyperlinks in a way that the CSI section, performance criteria and preferred help contents from the list of support structures should be clicked respectively.

To illustrate, a CSI officer who works at the crime scene investigation section can find help contents on the support panel in a way that they should select firstly the crime scene investigation section from main page of the support panel. Having been selected the section, all performance criteria are listed relating to the section (Figure 3.11).

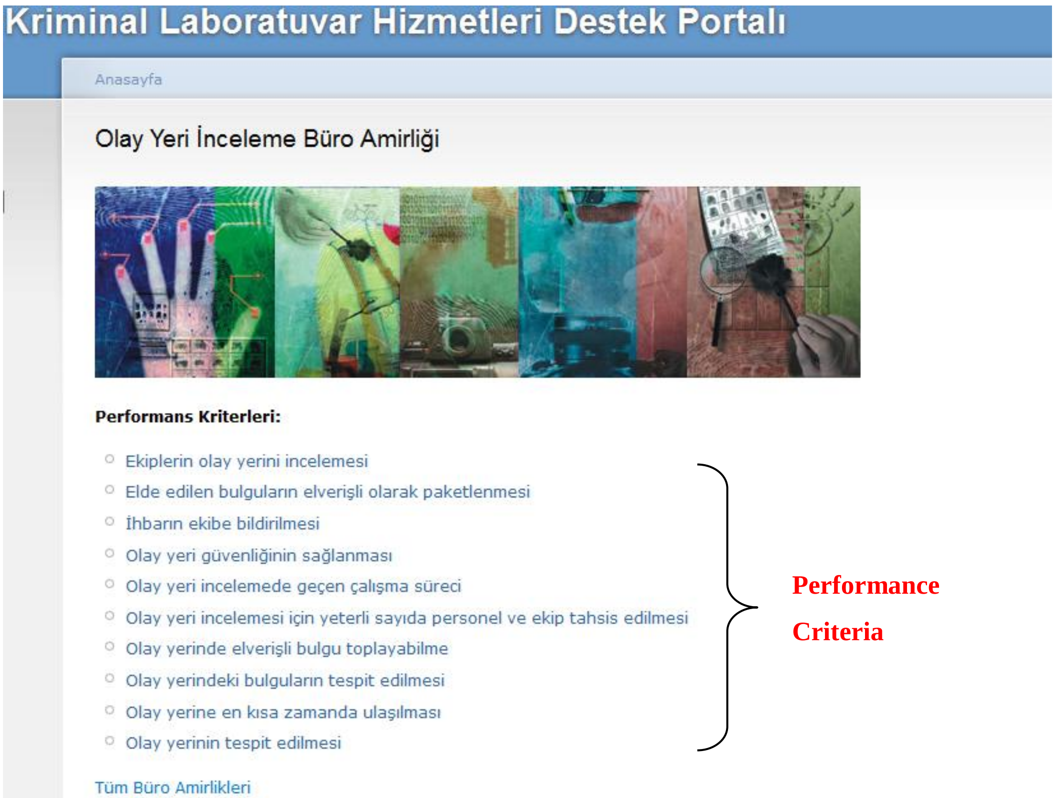


Figure 3. 11 Performance criteria for crime scene investigation section

After the performance criteria selection, all support structures are presented to be clicked to access help contents (Figure 3.12). Alternative views of the support structures are provided to the CSI officer working at crime scene investigation section to read help contents with respect to the searched topic.

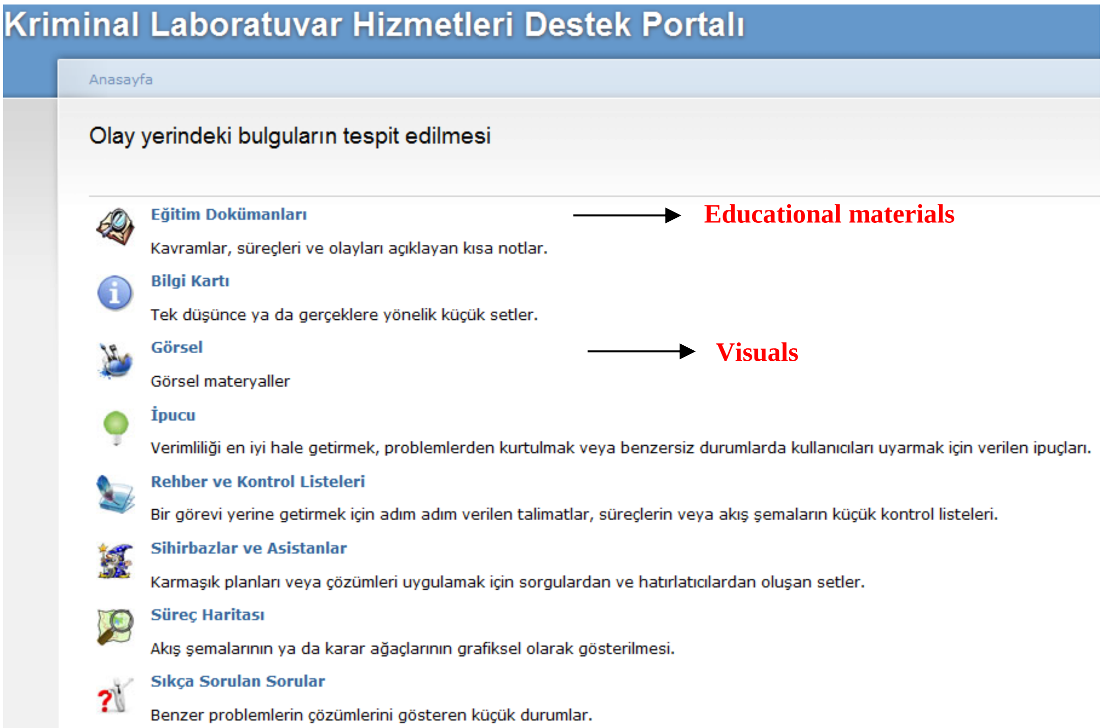


Figure 3. 12 Support structures involving help contents (External Support)

The external support system is similar to the extrinsic support system in that the same formats of the support structures are used in both. However, two additional structures are added to the support portal: (1) educational materials [Eğitim Dökümanları], and (2) visuals [Görseller] (Figure 3.12). Because performers have to leave the workspace in case of getting the external support, they can spend a lot of time reading the help content. Therefore, educational materials made up of many pages and contain more information about the selected help topic are developed and embedded in the support portal. For that purpose, Portable Document Format (PDF) files are created to be easily shared, printed and viewed by officers (Figure 3.13).

Figure 3. 13 A sample of educational material from the support portal

Moreover, visuals from training materials and books are also created and presented as separate support structures in the portal to be analyzed by the CSI officers (Figure 3.14).

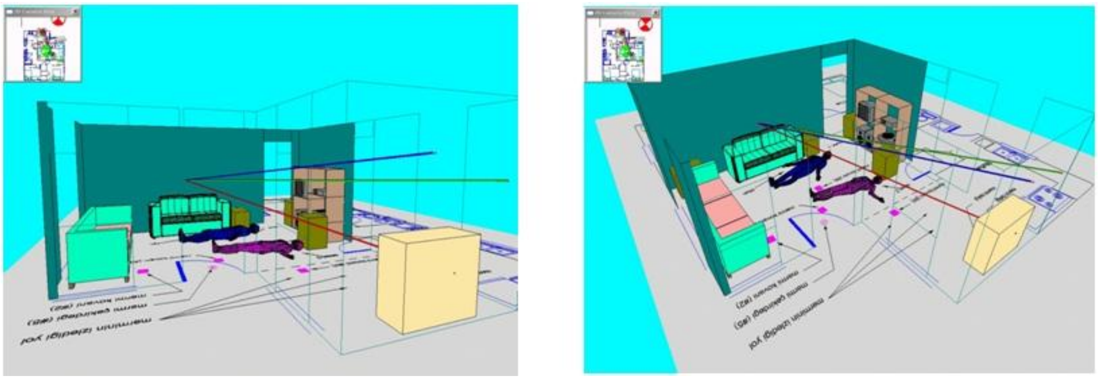


Figure 3. 14 A sample visual from the support portal

Besides hyperlinks, the external support includes a powerful search engine to access help contents by entering a keyword. When they submit their keyword, the external support system searches through the content repository and demonstrates to the performers a choice of help topics based on the question. A list of objects in the external support system which are contained in the searched keywords is presented to the performers (Figure 3.15). The CSI officers can select the appropriate content which seems to be the most relevant from the list of potential matches of the query to read from within support structures.

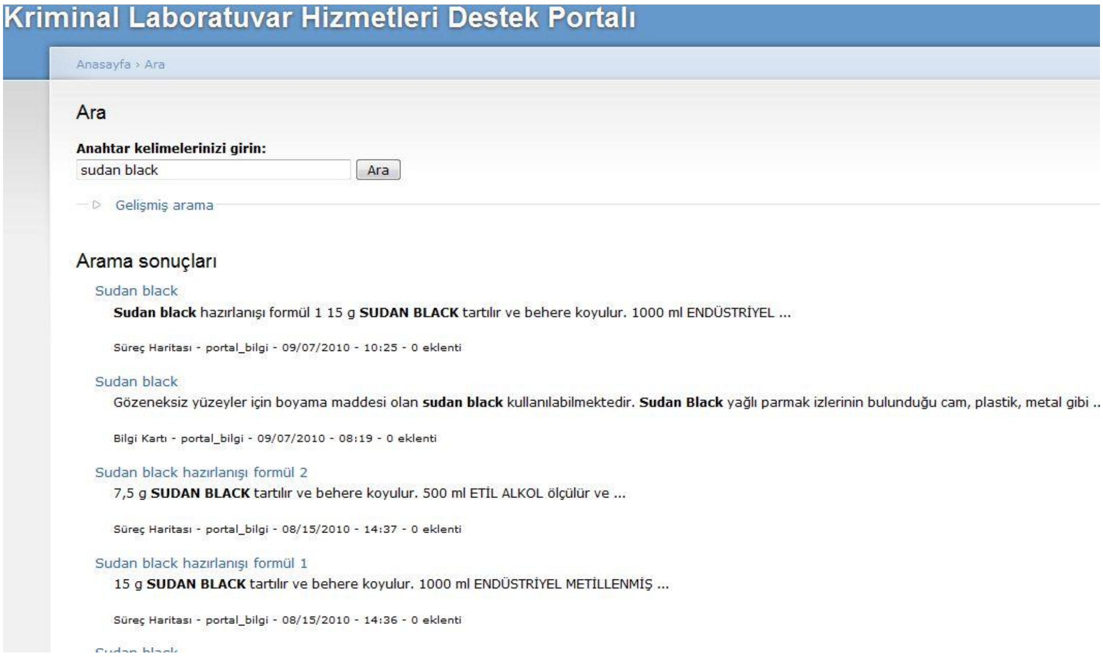


Figure 3. 15 External performance support: Search Engine

Moreover, they have a chance to filter their queries and expand the search opportunities in terms of performance criteria, CSI sections and support structures so that they can reach more relevant help topics requested to read (Figure 3.16).

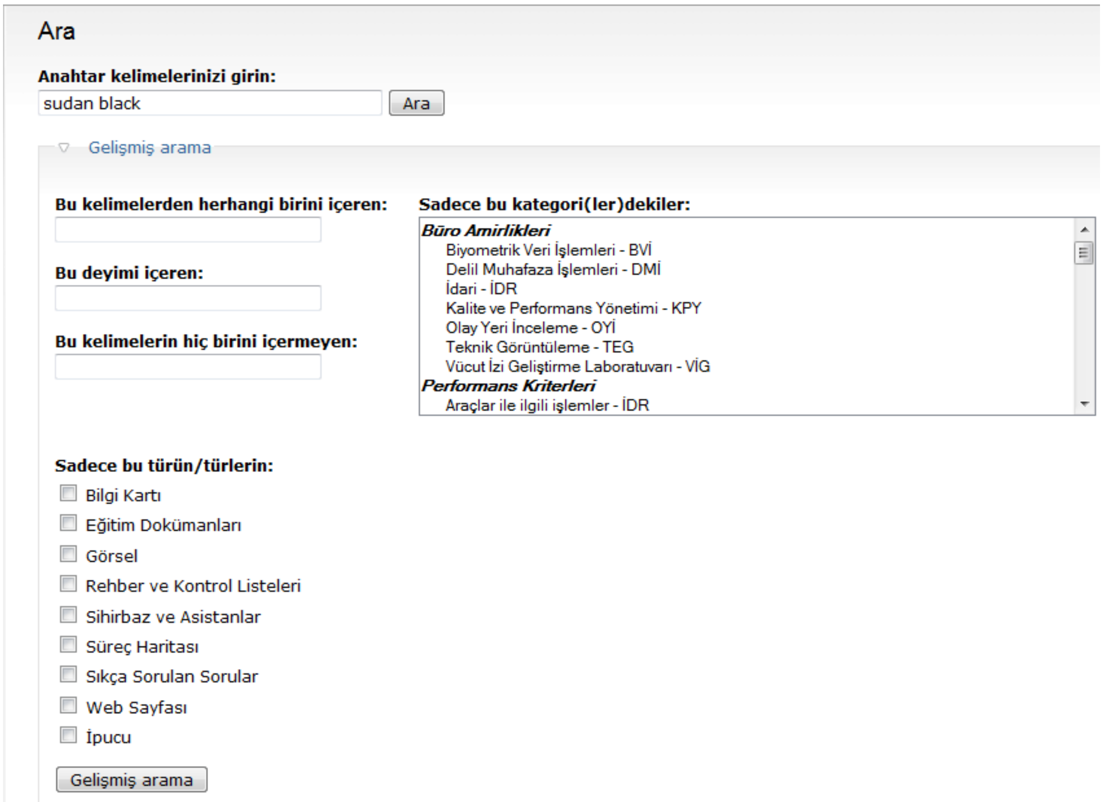


Figure 3. 16 External performance support: Advanced search

Regardless of the access types to the external support through CSI sections, performance criteria or search engine chosen, time of access, location, any help content presented in support structures read by CSI officers in the external support are recorded so as to determine which support structures and help contents are preferred mostly. Moreover, each clicked help content, and preferred support structure are opened by CSI officers are considered as an access to the EPSS; therefore, all activities are also recorded.

As a conclusion, an integrated EPSS offers a justifiable set of performance solutions to the CSI officers to improve their workplace performance with the intrinsic, extrinsic and external performance support levels. These different levels of the EPSS enable them to get performance support whenever needed and to simplify required work tasks by following procedures and workflow. In addition to its performance support, an integrated EPSS enables chiefs to track all activities generated by CSI sections. Any stored or input data can be used and monitored via varying amounts of information (Figure 3.17).

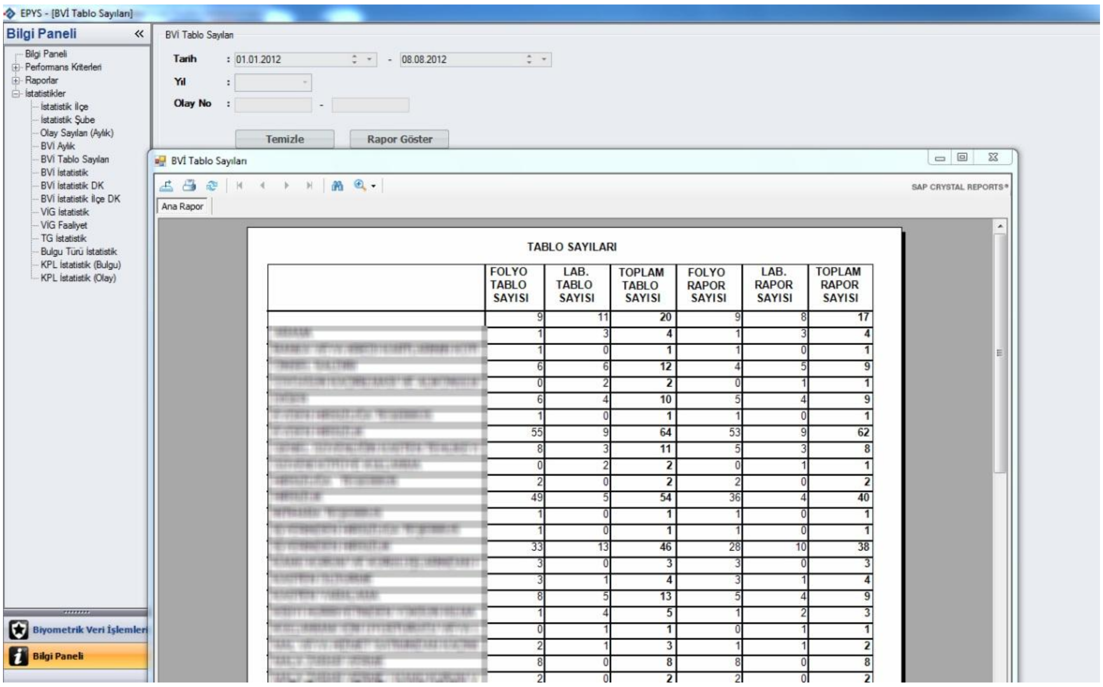


Figure 3. 17 A sample of performance data generated by the EPSS for chiefs.

Although chiefs can have a chance to see all performance data of the CSI Unit, individuals from any section can also monitor their performance in the main page of the interface (information panel) with filtered results. This option is presented in the interface designed for all sections as to provide evidence of task progression. That is to say, individuals from any CSI section know what they have done about a specific job task and what they must do as a next step for this task (Figure 3.6).

CHAPTER IV

FINDINGS

4.1. Introduction

The findings of the study are presented in this chapter. The organization of the chapter is specified according to the research questions stated in the previous chapters. First and foremost, performance and cause analyses findings are presented. In doing so, the essential and necessary background information as inputs for the EPSS and root causes of the performance factors are explored. Then, the evaluation of the EPSS is discussed in detail.

4.2. Performance Analysis

The first research question has been stated in the methodology chapter as "What is the value of the CSI Unit's existing information to which the HPT initiative intends to contribute?". To explore the whole picture of the CSI Unit's requirements and existing information for performance improvement initiative, official documentation was reviewed and analyzed in terms of five main categories: (1) vision and mission statements, (2) rules and regulations, (3) educational materials, and (4) performance criteria.

4.2.1. Vision and Mission Statements

As a first step of the performance improvement initiative, vision and mission statements of the department were obtained to direct the evaluation strategy of the initiative. The vision and mission statements of the department are defined as follows:

- The Criminal Police Laboratories Department's vision is to help investigation units combat scientifically all national and international crimes and provide the best forensic science service for Turkey.

- The Criminal Police Laboratories Department's mission is to provide forensic services, during legal and administrative investigations, for identification of both crimes and criminals by scientifically examining and interpreting physical evidence collected as well as by gathering physical evidence during the crime scene investigation.

From the statements, the aims and major accomplishments of the department cluster around the premise that supporting the justice decision-making process via reducing the time required for the identification of both crimes and criminals and serving the best forensic service for the society constitute the boundary circumstances for the CSI Unit. These inferences as outputs form a basis for the evaluation phase of the study, especially the item generation for the survey.

4.2.2. Rules and Regulations

As a governmental organization, the CSI Unit has a centralized structure and is affiliated to the Ministry of Interior in Turkey. Therefore, all responsibilities and duties that the CSI officers should do while doing their job tasks are determined by rules and regulations. All CSI sections' responsibilities and main duties are written separately in the regulations. Official documentation as a guide to the main workflow of the CSI Unit shows that the general procedures followed by the officers consist of the same steps. Although there are some differences regarding the application of the rules and

regulations among the CSI Units located in different provinces, the main workflows of the CSI sections follow the same procedures.
The main workflow and job tasks that the CSI sections do can be described as follows:

The crime scene investigation unit: Having been assigned to the criminal scene, the crime scene investigation unit is responsible for locating, collecting, recording, documenting, packaging and preserving physical evidence, fingerprints and other human generated prints from crime scenes. Using forensic science techniques, the investigators scrutinize and examine the scene and collect all types of evidence on the cases. Conducting their analysis, they have to document the crime scene through photographing, videotaping and also diagramming for supporting the justice decision-making process. A report compiling information about all evidence collected, related people, and other crime scene details is written by the investigators. This report plays a vital role in both showing the story of how the crime was committed and evolved and determining the guilt or the innocence of the individuals.

The evidence preservation section: All criminal evidence collected from the crime scene and other documents including the crime scene report are delivered to the evidence preservation section by investigators. The officers are responsible for keeping and submitting evidence to other related sections. Moreover, they are also responsible for the preservation of the items and distribution of materials to the legal authorities. All correspondence between the sections and the legal authorities must be done with official documentation.

The laboratory section: All the physical evidence collected from the crime scene is submitted to the laboratory section so that the expert from the laboratory section can trace evidence from the materials. Using both chemical and instrumental techniques, the experts conduct analyses in the areas of substances to develop latent prints from the physical evidence. In case the latent prints are developed from the materials, the officers must submit them to the biometrical data processing section for further analysis. In doing so, the analyzed evidence must also be returned to evidence preservation section to be transferred.

The biometrical data processing section: The biometrical data processing section is responsible for preparing, entering, and comparing fingerprints and other bodily generated prints. The experts from the biometrical data processing section compare prints recovered from crime scenes and generated by the laboratory section. To verify the identification of suspects and victims, the officers evaluate manually latent prints and compare them with the known inked or digitally recorded prints. Using an Automated Fingerprint Identification System (AFIS), the officers can search the unidentified prints against a database of fingerprint records so as to match them. The technical report should be written to be submitted to the legal authorities.

The technical imaging section: The technical imaging section is responsible for processing, printing, producing DVDs, and archiving all the materials digitalized from the crime scene. The officers must support and facilitate all the digital enhancement needs requested from other sections, most notably those of the laboratory section. Whenever latent prints are developed from materials in the laboratory section, the officers should take photographs of the prints and materials.

Although the main workflow can be described simply, it encompasses many sub-processes that all sections have to provide for the best forensic services. These procedures for all CSI sections are vital for the intrinsic performance support component of the EPSS is based completely on the workflow of the sections. The workflow interfaces providing intrinsic support simplify the procedures by guiding the officers through the investigation, analyses and documentation processes.

4.2.3. Educational Materials

Affiliated to the Criminal Police Laboratories Department, the Department of Criminal Research and Technical Investigation (DCRT) provides training in forensic and crime scene investigation. In-service training and branch training is offered to the staff after the completion of the basic training. Although the training is very specialized, it is vital to analyze educational materials, most notably printed books for providing performance improvement initiative. To create help contents embedded in the EPSS, thirteen printed books published by the CSI Unit and used in the in-service training provide a basis for the help contents.

The contents of the books are matched with the performance criteria so that they can be accessed with multiple paths and alternative views of the content can be supported. Basically, the help contents are used in both extrinsic and external performance support systems. As mentioned in the intervention section, help contents are embedded in the system and displayed in the support structures. The number of support structures in which help contents are integrated in the extrinsic performance support are depicted in Table 4.1.

Table 4. 1

The numbers of support structures displayed in the extrinsic support system

Support Structures	**CSI Sections**				
	Crime scene investigation section	**Technical imaging section**	**Biometrical data processing section**	**Laboratory section**	**Total**
Information Cards **[BILGI KARTLARI]**	39	8	7	11	65
Process Maps **[SÜREÇ HARITALARI]**	-	1	6	8	15
Wizards and Assistants **[SIHIRBAZ ve ASISTANLAR]**	-	1	2	2	5
Coaches and Checklists **[REHBER ve KONTROL LISTELERI]**	-	1	6	10	17
Tips **[IPUCU]**	-	15	3	5	23
Frequently Asked Questions **[SIKÇA SORULAN SORULAR]**	-	6	4	3	13
Total	39	32	28	39	138

Similarly, supports structures for the external performance support system are listed in Table 4.2. As outlined in Table 4.1 and Table 4.2, the extrinsic support system encompasses more the support structures - and help contents than the intrinsic support so that the officers can spend more time and read more help contents.

Table 4. 2

The numbers of support structures displayed in the external support system

	CSI Sections				
Support Structures	**Crime scene investigation section**	**Technical imaging section**	**Biometrical data processing section**	**Laboratory section**	**Total**
Educational Materials **[EĞİTİM DOKÜMANLARI]**	61	15	33	53	162
Visuals **[GÖRSELLER]**	4	2	2	11	19
Information Cards **[BILGI KARTLARI]**	131	14	72	50	267
Process Maps **[SÜREÇ HARITALARI]**	28	1	22	31	82
Wizards and Assistants **[SIHIRBAZ ve ASISTANLAR]**	12	3	2	15	32
Coaches and Checklists **[REHBER ve KONTROL LISTELERI]**	85	1	50	40	176
Tips **[IPUCU]**	66	22	32	39	159
Frequently Asked Questions **[SIKÇA SORULAN SORULAR]**	76	11	16	15	118
Total	463	69	229	254	1015

4.2.4. Performance Criteria

The Performance criteria and indicators were developed for CSI sections in the project. These criteria were written by the CSI officers for performance management issues and performance evaluation that would be used later on as one of the outputs of the project. The performance criteria and indicators are depicted in Table 4.3. As aforementioned, these criteria are used in the study as to provide external performance support. Particularly, whenever officers want to access help contents without using any search engine, they can step through the performance criteria to reach the desired and needed help contents as a stand-alone reference.

Table 4. 3

Number of performance criteria for CSI Sections

CIS Sections	Number of performance criteria	Number of performance indicators
Crime scene investigation section	11	17
Technical imaging section	8	18
Biometrical data processing section	8	22
Laboratory section	5	8
Evidence preservation section	4	4
Total	36	69

In conclusion, while the researcher used clearly defined vision and mission statements for guiding the evaluation phase of the study, workflow processes and procedures, support structures, help contents and performance criteria were used for design and development of the EPSS.

4.3. Cause Analysis

The second research question has been noted as "What are the root causes of the performance factors required to be improved to meet the goal of efficient and effective forensic services and activities offered by CSI sections?". In order to explore contributing causal performance factors required to be improved for the CSI officers, having conducted the pilot study; the main study was carried out. Consistent with the selected research design outlined in the previous chapter, firstly, quantitative findings (survey results) are presented; then qualitative findings related to quantitative results are given to prioritize determined factors.

4.3.1. Quantitative Findings of the Cause Analysis

In this section, quantitative findings of the main study for the cause analysis are presented. Beginning with background information of the participants, the confirmatory factor analysis (CFA) and multiple regression findings are also given in this part.

4.3.1.1. Demographic Information

Background information of the participants obtained from the survey (n=1176) is important for the study in that it describes the overall picture of the CSI Unit and the officers who work at the CSI sections (Table 4.4).

Table 4. 4

Demographic information of the participants

Variables		**n**	**Percent**
Gender	Female	72	6.2
	Male	1104	93.8
Ranks	Chief superintendent 3rd degree	2	0.2
	Chief superintendent 4th degree	7	0.6
	Superintendent	17	1.5
	Chief inspector	6	0.5
	Inspector	26	2.2
	Deputy inspector	4	0.3
	Police officer	1111	94.4
	Other	2	0.3
Age	20-30	242	20.5
	30-40	161	13.6

Table 4.4 *Continued*

Age	40-50	772	65.6
	51 or older	1	0.08
Active Status	Permanent staff	1176	100
Working Hours	8 hours (daily)	379	32.2
	12/12	72	6.1
	12/24	356	30.2
	12/36	109	9.27
	Other	260	22.1
Tenure (CSI Unit)	0-5	546	46.4
	6-10	425	36.1
	11-15	172	14.6
	16-20	26	2.2
	21 -	7	0.6
Education Level	Secondary school	2	0.17
	High school	144	12.2
	Associate	649	55.1
	Undergraduate	344	29.2
	Master	39	3.3
In-service training model	Face-to-face	699	59.4
	Internet based	157	13.3
	Blended	379	32.3
	Video-based	336	28.5
	Printed materials	252	21.4
	Workshop	630	53.5

In the study, while 1104 out of 1176 participants were male, 72 female CSI officers participated in the study. The results presented in Table 4.4 pointed out that a great majority of the participants as permanent staff of the TNP was at the rank of police officers (n=1111). Moreover, more than half of the officers were between the ages 40-50. Most of the officers worked both eight hours a day and routinely 12/24 hour shifts. The location, crime ratio, and personnel capacity are the main factors of different working schedules among the CSI officers. Although the CSI Unit had experienced officers, it is possible to say that a great majority of the participants were assigned to the CSI Unit for ten years. This result was also confirmed with the education levels of the participants. As outlined in the Table 4.4, most of the participants had got either associate's or undergraduate's degree. Lastly, the most preferred in-service training models were face-to-face and workshops among the participants. DCRT provides in-service training in forensic and crime scene investigation for the CSI Unit with printed materials, face-to-face classroom environments and workshops. Therefore, the preferences can be interpreted in terms of familiarities with used training models.

4.3.1.2. The CFA Findings

The mean scores and standard deviations obtained from the survey items (both performance related and organizational performance questions) are presented in Appendix K and Appendix L. To determine contributing causal performance factors, firstly, the findings of CFA was employed to confirm the factor structure obtained using exploratory factor analysis. The maximum likelihood estimation method was used. Figure 4.1 depicts the model specification and the parameter estimates. As interpreted from the figure, three dimensions of the root causes of the performance factors (workplace, competency, and job value) were allowed to correlate to each other.

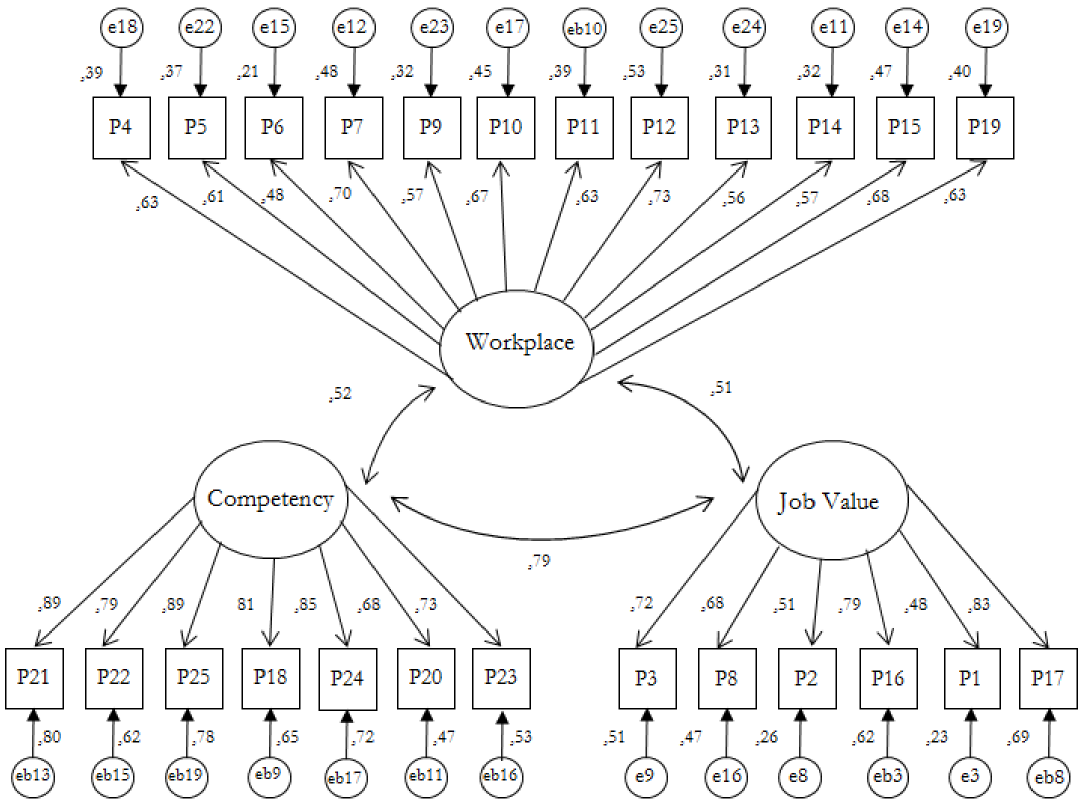


Figure 4. 1 Standardized coefficients for the three-factor model

To evaluate the fit between the model and the data, multiple goodness-of-fit tests were employed. The hypothesized model was evaluated by three measures: (1) the non-normed fit index (NNFI), (2) the comparative fit index (CFI), and (3) the root mean square error approximation (RMSEA). The chi square had a value of 1695.979 (272, N= 1176), p = .000, indicating a poor fit of the model. However, chi square value is usually statistically significant for the models with more cases (Brown, 2006; Meyers, Gamst, & Guarino, 2006). By virtue of the problems with chi square statistics, alternative measures of fit indices have been proposed in the literature (Meyers et al., 2006). Indeed, chi square statistics should not be used as the sole index in the studies (Brown, 2006). In this study; therefore, alternative indices were considered rather than chi square statistics. Both the CFI and NNFI yielded values of .987 and .985, respectively, pointing out a good fit of the model. The RMSEA index value, closer to zero indicative of a well-fitting model, was .067, indicating a moderate fit.

As a conclusion, results from the CFA suggested that three-factor structure fits well to the sample data with all fit indices. Moreover, factor loadings pointed out that there were a significant contribution of each item to the corresponding dimension. While the standardized coefficients ranged from .48 to .73 for the workplace dimension, the values ranged .47 to .80 for the competency and .23 to .69 for the job value dimensions. In coherence with Gilbert's (2007) BEM, the 25 item survey was found to measure the root causes of the performance factors (workplace, competency, and job value) related with both the environmental and the repertory of behavior:

- Workplace for performance factors (Items 4,5,6,7,9,10,11,12,13,14,15,19)
- Competency for performance factors (Items 18,20,21,22,23,24,25)
- Job Value for performance factors (Items 1,2,3,8,16,17)

4.3.1.3. The Multiple Regression Findings

Following the CFA findings, the multiple regression analysis was employed to understand how well these three performance factors were able to predict perceived organizational performance of the CSI Unit. A model of three factor/variables best predicted organizational performance: workplace, competency, and job value. Table 4.5

depicts the means, standard deviations, and intercorrelations for dependent variable and predictor variables.

Table 4. 5

Means, standard deviations, and intercorrelations for organizational performance and predictor variables

Variable	*M*	*SD*	1	2	3
Organizational Performance	5.81	1.06	.73	.49	.40
Workplace	5.62	1.02	-	.48	.45
Competency	6.52	0.68		-	.64
Job Value	6.60	0.64			-

These performance factors were significantly related to organizational performance, F (3, 1116) = 475.68, *p*=.000. According to the results, this model explained 56.2 per cent of the variance in organizational performance. The summary of the model is presented in Table 4.6. As outlined in the table, although workplace and competency factors were making a significant unique contribution to the prediction of the organizational performance, the job value factor was not. Of these two variables, the workplace (.65) made the strongest unique contribution to explain the organizational performance of the CSI Unit, while the competency variable (.18) contributed less. Moreover, the squared semipartial correlation coefficient values indicated that workplace factor uniquely explained 31 per cent of the variance in organizational performance while a unique contribution of 1 per cent to the explanation of variance in organizational performance was explained by the competency factor (Table 4.6).

Table 4. 6

Regression analysis summary for the root causes of the performance factors predicting organizational performance

Variable	*B*	*SE B*	β	t	sr^2
Workplace	0.68	0.02	0.65	28.02*	.31
Competency	0.28	0.04	0.18	6.75*	.01
Job Value	-0.01	0.04	-0.01	-0.29	.00

R = .750; R^2 = .562. *$p < .001$.

In conclusion, it is resulted from the quantitative data that the primary causal factors of the performance issues for the CSI Unit can be classified under two main headings; workplace and competency. In other words, the quantitative part of the cause analysis results identified that the probable sources of the CSI Unit's performance issues could be grouped under these two different areas. As Gilbert (2007) proposed either the lack of environmental support or the lack of repertory of behavior for the performer might be attributed as possible causes of the performance. In coherence with this model, workplace and competency factors corresponded to environmental support and lack of repertory behavior, respectively.

4.3.2. Qualitative Findings of the Cause Analysis

In this part, the qualitative findings are given so as to explain and clarify quantitative results obtained from the previous section. As mentioned above, the survey revealed that there were two general casual factors on organizational performance: (1) workplace, and (2) competency. To obtain in-depth information and specify sub-categories of these determined performance factors, a series of four focus groups were conducted with different ranks of CSI officers. The findings of these focus group interviews are presented in the next section.

4.3.2.1. Workplace

The quantitative part of the cause analysis identified a definite root cause of environmental support as Gilbert's (2007) proposed. Following this categorization, qualitative results showed that workplace as an environmental support for the targeted behaviors had lacks in two main areas: (1) information, and (2) resources.

4.3.2.1.1. Information

As a first category, information captured primary influences on relevant information which covered interactions among officers and descriptions and measures of job tasks, including subcategories of the relevant guides, communication, problem solving, and participation (Table 4.7).

Table 4. 7

Sub-categories of the information factor

Factor	Sub-categories
Information	Relevant guidance, communication, problem solving, participation

For the CSI officers, relevant guidance provided by chiefs could be considered as one of the main factors that had an impact on their performance. An overwhelming majority of the CSI officers (n=15) stated that they could meet their chiefs whenever needed and exchange ideas regarding job tasks. One police officer from the crime scene investigation section reported that "…*In general, we have a good dialog with our chiefs. We can share all the things which can be either actual or related with the job. We have never experienced difficulty so far…* [1]"

Moreover, they also conducted official meetings to get together and exchange ideas relating to work and workplace. One superintendent commented that,

> …As an official requirement of our quality management system, we arrange meetings every month to talk about positive and negative understandings of our job tasks. It is not limited with these meetings, the officers who have problems or any suggestions regarding job tasks can come and share with us when needed… [2]

Relevant guidance was provided by chiefs for the officers with relevant feedbacks, and performance coaching and monitoring. Almost all the participants in the focus group (n=20) pointed out that receiving feedback from their chiefs was very valuable as it helped them get information about required tasks or problems. One CSI officer from the laboratory section stated that "*In our laboratory, there is an interactive relation. Feedback is provided inevitably. Our chief is also an expert like us. He is in all the processes* [3]".

Another CSI officer from the crime investigation section emphasized the importance of the relevant feedback and its role as:

> …We receive feedback. When we examine crime scenes; to illustrate, our chiefs give feedback after our investigation. He comments on our methods or on missing parts of the investigation. His general comments like: you should have done your investigation like that or this part of the investigation is good...I mean there are not too many formalities here… [4].

Performance coaching and monitoring as another category of the information factor played a vital role in the CSI Unit. A significant segment of the sample of CSI officers (n = 18) stated that coaching and monitoring of the performance was needed especially whenever they encountered any difficulties about their job tasks. One officer provided detailed information that "…*If I face a difficulty regarding my job, my chief will be ready to find a solution like a library...If there is a problem that cannot be solved, we meet with our chief who is more accountable to the manage the tasks* [5]".

As the following example demonstrates, the relationship level between the officers and chiefs could be more decisive for the organizational performance.

> …We can speak every morning. Moreover, we can inform our chief about all processes of the investigated crime scene. Moreover, if I [chief inspector] realize that the personnel are having problems in solving an issue, I will need to meet the chief and negotiate for a solution path [6].

A great number of officers (n=15) responded that communication, as another sub-category of the information factor, between officers from different locations was also important for doing job tasks well. In general, the qualitative part of the cause analysis results identified definite communication issues between the CSI Units located in different provinces. The lack of sharing information (n=9) about job tasks and other job-related issues was identified as root cause of the performance factor. One CSI officer from criminal investigation section commented that,

> …Although sharing information between experts is so important, we are unaware of each other. We do not know what they [CSI officers from different provinces] do, and also they do not have any idea about what we do… [7].

Another officer from the laboratory section stated that "…*First and foremost, there is a lack of communication. We do not have any communication instrument even with CPDL. I provide interpersonal communication*… [8]". At this point, the participants made some very helpful suggestions to overcome this issue. One officer's offered that "…*after all, there is a necessity to develop a system that all personnel can communicate with each other* [9]".

Results revealed that another root cause of performance in the information factor was problem solving sources. Half of the CSI officers (n=11) pointed out that co-workers, chiefs and official meetings were the solution paths of the faced problem. One of the police officers from the biometrical data processing section explained his solution path as follows;

> …If I face a problem about my job task; firstly, I will get professional help from <u>my co-workers</u>. If we do not solve the problem, we can request help from <u>our chiefs</u>. If the problem is so general, a solution will be found via <u>official meetings</u> [10].

Some of the respondents (n=8) stated that other solution sources were printed materials and documents. Different from the first solution path presented above, materials and documents were considered as the first solution sources. Then, co-workers and chiefs were requested for help. One of the laboratory experts stated that,

> …if the problem results from the instrument used in the job, we will follow procedures printed in the documents to understand the origins of the problem. If we do not find any evidence, we will consult the most experienced officers and chiefs. However, we have never faced big problems which cannot be solved… [11].

Participation as a last sub-category of the information factor was considered as a root cause of the performance by few of the CSI officers (n= 7). The CSI Unit is a very hierarchical governmental organization in which the officers' status is clearly defined. Therefore, the participation in decisions was considered both positively and negatively by the officers. This is illustrated well in two statements commented by two different

CSI officers; "…*Turkish National Police is a hierarchical organization; therefore, I think, it is not so important for the police officers to participate in decisions about jobs…* [12]"; "*I believe that there is not too much formality in our unit. We can tell our opinions without hesitation* [13]".

As a conclusion, relevant guidance provided by chiefs, communication opportunities between performers, problem solving sources, and participation to the decisions were identified as generic sub categories of the information factor.

4.3.2.1.2. Resources

Resources as a second category covered the tools, references, procedures and documentation designed to support optimal work outputs, including the sub-categories of reference materials and tools, standardization, and documentation (Table 4.8).

Table 4. 8

Sub-categories of the resources factor

Factor	Sub-categories
Resources	Reference materials/tools, standardization, documentation

For the CSI officers (n=16), reference materials and tools that were required to perform job tasks could be considered as one of the main factors that have an impact on their performance. As the following example stated by an officer demonstrates, the references and printed materials (n=12) they need to their job duties existed but they were not functioning properly because the officers lacked access to these documents; "…*We have rules and regulations about how to do our job tasks; however, it is really difficult to find required information. Rather, when they are needed, these materials should be in hand for all officers…* [14]".

Similarly, another CSI officer from the laboratory section offered a solution and pointed out that,

> …We have great difficulty remembering the outcome of the training which we received 5-10 years ago. Actually, this situation is normal. If you do not practice, you can forget. Therefore, you need references which enable you to look and find whatever needed. It may be accessed electronically so we can use them when we are appointed to other locations as well… [15].

As for the tools, the participants (n=9) stated that there was a growing need for technological tools to increase the quality of the forensic services they offered. One chief inspector reported that "…*we have logistic problems. We need high technological tools to demonstrate our skills…In other words; we have to do something regarding technical tools because we are a little inadequate* [16]". Emphasizing the importance of the technological tools for better service, another CSI officer commented on this issue in the following way: "…*Our equipment in terms of tools and materials has increased day by day. I mean, we have got good opportunities. The more opportunities we get, the better forensic services and activities we produce…* [17]".

Standardization was invariably cited by CSI officers (n=12) as a generic idea in need of performance improvement. The findings revealed that the workflow (n=7) being done and procedures (n=6) which are followed by officers in the scientific criminal examinations varied between provinces and CSI sections. That there was a growing need for standardization relating to workflow and procedures was emphasized through focus group interviews. One superintendent pointed out that,

> …Related with personnel numbers and crime ratios commented in the provinces, the workflow of the criminal services is served differently in the sections. As we follow same tasks written in our regulations, the standardization should be provided through all provinces [18].

Similarly, one officer from the laboratory section pointed out that,

> …When you are appointed to a different province, the main difficulty is to learn the procedures that they follow. Because you are accustomed to old procedures; to illustrate, expert reports that I have to write after my

examination are produced differently in terms of their formats and contents…Ultimately, we do the same job [19].

Another clear performance deficit revealed during the performance analysis was documentation (n=12).

> …another problem that we have is documentation. Because we do not write and record, we lose many things. I think it is the biggest problem to be solved. In particular, we do not document printed and visual materials although we have developed them [20].

In the above extract one deputy inspector described the lacks of the system and procedures in providing documentation. Similarly, another superintendent declared that,

> …we do not have any developed literature. For example, we have written a book for DCRT. I suppose it would be really beneficial for us that the procedures in the book showing step by step tasks be presented via the internet and so that we can search and find whatever we want to find… [21].

Access to reference materials and tools, standardization regarding general workflow and procedures and documentation issues were identified as general sub-categories of the resources factor.

As a conclusion, seven of the root causes as sub-categories of the information and resources factors were tied to the workplace or to issues external to the CSI officers. Although some of the root causes existed in the sections, it was concluded that others could be improved via a performance initiative.

4.3.2.2. Competency

Like the workplace factor, the quantitative part of the cause analysis identified explicit root causes of personal characteristics or repertoires of the CSI officers. Competency as a repertory behavior factor for the targeted behaviors had lacks in two general areas: (1)

knowledge, skills, and abilities (KSAs) and (2) capacity. That is to say, the personal characteristics of the CSI officers that may have contributed to the performance issues were capacity and KSAs.

4.3.2.2.1. Knowledge, skills, and abilities (KSAs)

The first category KSAs captured primary influences on competencies of the CSI officers which encompassed main requirements of the individuals and training opportunities offered by the unit, including the subcategories of required knowledge, required skill, required ability and training (Table 4.9).

Table 4. 9

Sub-categories of the KSAs factor

Factor	Sub-categories
Knowledge, skills, and abilities	Required knowledge, required skills, required abilities, training

For the CSI officers (n=18), those who work at the CSI unit should have extensive knowledge of forensic services and activities. Regardless of the CSI section worked, all officers should acquire required and elemental knowledge of criminal processes. This is illustrated well in the statement reported by one chief inspector:

> …First and foremost, s/he should have a good understanding of what s/he is doing at their job. That is to say, s/he should have extensive knowledge of what is being done there [CSI section]. S/he should be aware of all the processes; to illustrate, if s/he is working at the biometrical data processing section, s/he should have elemental knowledge. More specifically, s/he should know whether a gun collected from a crime scene is hand-made or original when it arrives to the section… [22].

Similarly, another superintendent emphasized that,

> …the officer who wants to work at the crime scene investigation section should have knowledge of electronics and computers. Moreover, s/he should

> know investigation procedures such as chemical and powdering methods. After that transfer, collecting and packaging methods are also important requiring them to take special training. If s/he does not know these, s/he will not deserve to be a CSI officer or s/he will take adequate training… [23].

Therefore, qualitative results showed that required knowledge of forensic activities and criminal investigation was instrumental in bringing about the performance improvement of the CSI Unit. Likewise, in their responses to the question, most of the respondents (n=14) indicated that the job officers do demanded a high degree of skill. One chief superintendent 4th degree pointed out that,

> …s/he [the officer] should be careful and see crime scene and forensic activities from a different perspective. S/he should see details. To do this, s/he should have the power of reason. Moreover, s/he should have a required skill so that s/he can know why these activities are done [24].

Moreover, different sections located in the CSI unit require officers to have specific skills for particular job tasks. This situation was illustrated well in the statement of one superintendent for the officers from investigation section:

> …An officer who works at the crime scene investigation section should be curious about everything. S/he should possess great skills at using crime scene investigation kits. In our investigation car, 15-20 different tools are installed. The officer should have required skills to use this equipment [25].

Like knowledge and skills, the CSI officers should have the abilities to provide forensic services. A great many CSI officers (n=12) responded that physical abilities had to be demonstrated conclusively so that criminal activities could be performed well. One chief inspector emphasized that "…*I think the officer should demonstrate physical abilities while s/he performs in a criminal investigation. This is the bottom line. S/he should tend to do job tasks.* [26]". Similarly, one other superintendent reported that,

> …The CSI officers should use their abilities with great dexterity… For example, lots of tools and technical equipment are used in the crime scene investigation and other CSI sections. We think that they should use these in the correct way as a consequence of [in-service] training [27].

As mentioned in the above extract, many CSI officers (n=12) uttered that in-service training played an instrumental role in terms of performance improvement. Results showed that many CSI officers (n=7) stated that training needs were valid for the officers as a constant requirement to perform well. One superintendent made a point that,

> …It is apparent that education is required because of the fact that knowledge as a system changes and reconstructs itself continuously. We feel that as a department, as a section or as individuals, we always need education. Therefore, in-service training is so important for individuals to improve themselves… [28].

An officer from the laboratory section emphasized one of the many benefits of in-service training in terms of its impact of their performance:

> …after training, you can get a chance to investigate the events in detail and consider different points of view. [After training] you realize that the things assumed as true and real can become completely wrong. That is why I believe education is essential for us… [29].

As the following example indicates, as many officers stated (n=8), in-service training needs also emerge from the situation when conditions on the job task change.

> …Advances in technology have dramatically altered nowadays. New products result in new procedures to which we have to adapt our job. As well as experts, individuals should improve themselves by receiving training in how to use and adapt to new technologies and procedures… [30].

Although the CSI Unit provide in-service for the officers, as aforementioned, some other respondents (n=5) claimed that there was a lack of receiving in-service training. The complaints were mainly made by police officers. One participant reported that "…*I have not received any training in how to use the equipment which I use at my job. I have requested in-service training. We demand this frequently from our departments* [31]". Similarly, another CSI officer pointed out that,

> …We had a training office called SASEM. The courses offered from the office did not last for more than three years. Even when you had a course, this opportunity was for one time only. Renewals of these courses were not provided [32].

As a conclusion, the KSAs factor as root causes of the organizational performance factor covers the officers' required knowledge, skills, and abilities, and also training opportunities offered by the CSI Unit.

4.3.2.2.2. Capacity

The second category of the competency factor was labeled as a capacity covering influences on behaviors that have an impact on the CSI officers' performance, including sub-categories of required capacity, problem solving, practice, and experience (Table 4.10.)

Table 4. 10

Sub-categories of the capacity factor

Factor	Sub-categories
Capacity	Required capacity, practice, experience

Qualitative results showed that required capacity was considered as one of the root causes of the performance factor. Capacity was invariably cited by the CSI officers (n=14) as a general area in need of performance improvement. One police officer stated that "…*The individual working at CSI Unit should have required capacity to use tools and technological equipment. Moreover, s/he should be open for improvement and should be a real* *investigator…* [33]". Similarly, a CSI officer from laboratory section emphasized the importance of the capacity in the following way: "…*The expert should work mentally at full capacity. S/he should not lack capacity to perform at job tasks…* [34]".

Besides capacity, another determinant of the performance as a factor was labeled as practice. This sub-category embodied the significance of the practice. As CSI officers (n=10) stated it covered the performance issue where practical applications should come into prominence. The participants complained mainly about training methods that emphasized theoretical base rather than practice. One officer from a laboratory section reported that,

> …When a new investigation procedure is introduced, we receive specific training about this method. After this theoretical base, we get some practice. If we do not use this method or equipment introduced or if we do not analyze any evidence collected regarding this procedure, we forget all the theoretical and practical knowledge about this. Therefore, we should get more practice periodically or find something to solve this issue [35].

The same performance issue was emphasized by another officer from the crime scene investigation section in the following way: "…*Generally, we receive classroom trainings. However, we have to add practical applications to this theoretical side. Nothing happens with only theory…* [36]".

Lastly, the participants (n=11) pointed out that experience played an instrumental role with regard to the improvement of their performance. Results revealed that the more experienced officers work at CSI sections, the better forensic services are rendered to identify both crimes and criminals. The following quotation from one officer illuminated this:

> …Experience is important in our unit. When experts encounter a problem, they find a solution more easily in comparison with novices. Therefore, the most important thing for the CSI Unit is to be an expert… [37].

Similarly, another officer from the crime scene investigation section reported that "…*Like other sections, the crime scene investigation depends on experience. If you have the experience for the job, you will perform automatically your job tasks* [38]". One other officer made a very helpful suggestion and commented that,

> …You should be curious. After training, you should expand what you have learned. In doing so, you can improve yourself. Rather than giving up, I think we should improve ourselves in criminal services and activities… [39].

Required capacity to perform well, practical applications including theoretical base, and experience were identified as generic sub-categories of the capacity factor. As a conclusion, seven of the root causes as sub-categories of the KSAs and capacity factors were tied to the repertory behavior of the CSI officers.

More generally, it is possible to conclude that fourteen basic influences on human behavior impacted performance. They were grouped under two different areas: (1) workplace – information (required guidance, communication, problem solving, and participation) and resources (reference materials and tools, standards, and documentation, and (2) competency – KSAs (required knowledge, skills, abilities and training) and capacity (required capacity, practice, and experience).

The classified primary root causes of performance factors as well as identified and prioritized categories and subcategories of these factors were presented in the fishbone diagram (Figure 4.2.). The diagram was used to highlight the interconnected root causes of performance. Moreover, in the diagram, for each major factor, detailed root causal factors were written as minor causes (sub-categories).

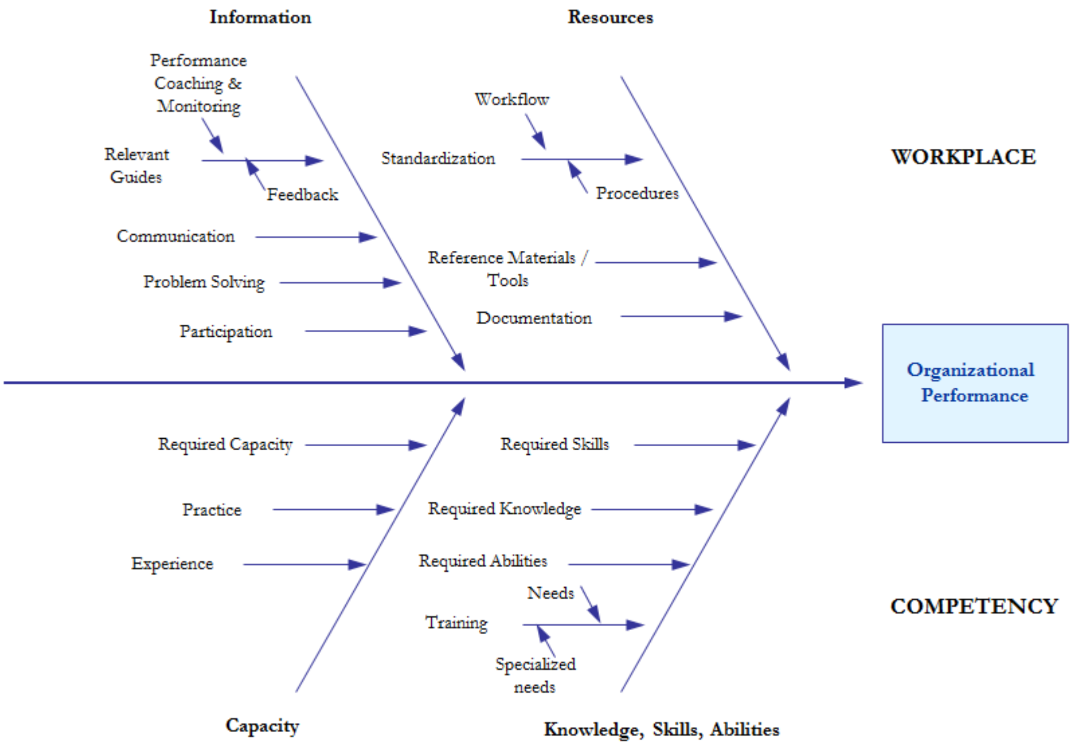


Figure 4. 2 A Fishbone Diagram of Root Causes of Performance Factors

As a conclusion, performance and cause analysis results revealed that it was necessary to select the intervention that would alleviate root causes of performance and benefit both the CSI officers and the CSI Unit.

4.4. Evaluation

The third research question has been stated as "Does the EPSS intervention as a performance improvement initiative achieve the impact, effectiveness and perceived benefits expected on individual and organizational performance?". Having been implemented, the summative evaluation of the EPSS was conducted. In order to evaluate impact, effectiveness, and perceived benefits of the intervention, the main evaluation study was carried out. Consistent with the sequential explanatory research design outlined in the previous chapter, first and foremost, quantitative findings are presented; then qualitative findings related to quantitative results are given so as to validate these results and give in-depth information regarding the evaluation of the intervention.

Taking into account the representation of the findings obtained through both quantitative and qualitative data collection processes, the evaluation results are outlined in terms of Kirkpatrick's and Kaufman's framework. Therefore, the results are discussed under the following respective levels: (1) reaction, (2) implementation, (3) behavior, (4) results, and (5) societal benefit.

4.4.1. Quantitative Findings of the Evaluation

Quantitative findings of the evaluation phase of the study were composed of both survey results and computer logs' findings recorded through the implementation period. As aforementioned, computer logs were recorded as to explore effectiveness and successfulness of the EPSS components and structures; therefore, data obtained from logs was related only with the implementation level of the evaluation process. Besides survey results, findings of the heavily used support structures of the EPSS are presented in the intervention part. Moreover, checklist and open-ended (last survey question) results as quantitative findings are presented under a different title, feedback to the EPSS and revisions with qualitative results.

4.4.1.1. Demographic Information

Demographic information of the participants obtained from the survey (n=191) are presented in this section (Table 4.11).

Table 4. 11

Demographic Information of the participants

Variables		n	%
Gender	Female	6	3.1
	Male	185	96.9
Age	20-30	12	6.3
	31-40	115	60.2
	41-50	61	31.9
	51 or older	3	1.5
Tenure (CSI Unit)	0-5	36	18.8
	6-10	76	39.8

Table 4.11 *Continued*

	11-15	61	31.9
Tenure (CSI Unit)	16-20	14	7.3
	21 -	4	2.0

In the study, 191 out of 185 participants were male while only 6 female CSI officers participated in quantitative part of the evaluation study. The results presented in Table 4.10 revealed that more than half of the CSI officers (60%) were between the ages of 31-40. Moreover, a very high majority of the officers who participated in the study had been assigned to the CSI unit for ten years.

4.4.1.2. Reaction

The level 1 evaluation (reaction) data was gathered through the survey to understand immediate reactions to the multiple and specific integral parts of the implemented EPSS. For the purpose of this evaluation phase, the level 1 evaluation section addresses the following research question: "What is the reaction of the CSI officers to the EPSS intervention?". In the Table 4.12, the survey items are tabulated in terms of their mean scores.

Table 4. 12

The mean scores and standard deviations on the reaction items

Items	M.	S.D.
I think that the presentation of the help contents in different structures (educational materials, information cards, tips, etc.) is very effective.	4.61	0.51
The use of an EPSS helps me to do my job well.	4.57	0.52
I think that the use of an EPSS makes a significant contribution to my personal development.	4.54	0.51
I think that user manuals are useful in terms of accurate usage of the system.	4.54	0.55
The support structures embedded in an EPSS are consistent with my job.	4.53	0.54
The use of an EPSS helps me to perform my job better by satisfying my personal needs.	4.53	0.52
I am satisfied with the general system.	4.53	0.53
Using an EPSS enhances my communication with colleagues regarding my job.	4.38	0.64
The use of an EPSS helps me to capture new knowledge about my job.	4.36	0.59

From the table, it was apparent that all reaction items had mean scores above four and a standard deviation around zero point five. While the participants were satisfied with the general system (M=4.53), the most positive reactions toward the EPSS resulting from the benefits provided by the system were clustered around the presentation of help contents in different structures (M=4.61), supporting the officers to do their job well (M=4.57), making a significant contribution to personal development of the CSI officers (M=4.54), and the importance of the user manuals for the accurate usage (M=4.54).

The overall mean score across the nine items was 4.51, indicating positive reactions toward the statements about multiple and specific integral parts of the EPSS. That is to say, the CSI officers had an overall positive reaction to the integrated EPSS.

4.4.1.3. Implementation

The level 2 evaluation (implementation) data was gathered through the survey and computer logs to explore whether successful implementation of the EPSS components had been achieved as planned. Therefore, the level 2 evaluation section addresses the following research question: “To what extent are the EPSS types and support components being deployed and used as they are planned?”.

More specifically, the survey items were designed to explore preferred EPSS types (external, extrinsic, and intrinsic) to answer the following question: “To what degree do the EPSS types (intrinsic, external, or extrinsic) contribute to the CSI officers’ productivity?”. Likewise, computer logs were used to answer two sub-questions: “Which support structures are heavily used?” and “Which are preferred?”. While the survey items filled out by the CSI officers reflected their experiences concerning their productivity, computer logs demonstrated actual and hard performance data. One discrete feature of these performance data was that only support structures which were embedded in support portal (external) and support panel (extrinsic) were recorded. In Table 4.13, the survey items related to implementation level were tabulated regarding mean scores.

Table 4. 13

The mean scores and standard deviations on the implementation items

Support Structures	M.	S.D.
Workflow Interface (Intrinsic)	4.29	0.52
Support Panel (Extrinsic)	4.20	0.60
Support Portal (External)	3.92	0.63
Main Portal (External)	3.84	0.65

Results revealed that the workflow interface (M=4.29) made a major contribution to the CSI officers' productivity by providing performance support when needed. Similarly, it is possible to conclude that the support panel (M=4.20) made much of a contribution in their productivity. Moreover, the officers received some expected return from both support portal (M=3.92) and main portal (3.84).

As for support structures' preferences, the CSI officers used both external and intrinsic support structures at varying degrees when they received performance support regarding their job tasks. Table 4.14 depicts the numbers of preferred support structures executed by the CSI officers during the implementation period.

Table 4. 14

Preferred Support Structures

Support Structures	External	Extrinsic
Educational Materials [Eğitim Dökümanları]	112	-
Visuals [Görseller]	16	-
Information Cards [Bilgi Kartlari]	77	57
Process Maps [Süreç Haritalari]	15	22
Wizards and Assistants [Sihirbaz ve Asistanlar]	16	8
Coaches and Checklists [Rehber ve Kontrol Listeleri]	38	30
Tips [Ipucu]	24	13
Frequently Asked Questions [Sikça Sorulan Sorular]	25	11

It is apparent that when the CSI officers decided to get performance support via external support (support portal), educational materials were the most preferred support structure with 112 entries. In other words, the officers preferred to receive performance support via educational materials made up of many pages and containing more information about the selected help topic when they left the workspace. During the implementation period, information cards displaying single ideas or small sets of fact, and coaches and checklists made up of step by step instructions were the other preferred support structures with 77 and 38 entries, respectively.

As for the extrinsic support type, the CSI officers preferred mostly information cards when they decided to get performance support while they were performing their job tasks. That is to say, single ideas or small sets of facts were accessed 57 times by clicking the "?" button became the most preferred support structure. Coaches and checklists, and process maps were the other preferred support structures with 30 and 22 times access, respectively.

4.4.1.4. Behavior

The level 3 evaluation (behavior) data was gathered through the survey to explore effectiveness and perceived benefits of the EPSS. Therefore, the level 3 evaluation section addresses the following research question: "To what extent is the EPSS perceived to improve performance of the CSI officers?".In Table 4.15, the survey items relating to behavior levels were tabulated regarding mean scores.

Table 4. 15

The mean scores and standard deviations on the behavior items

Items - Using the EPSS,	**M.**	**S.D.**
I can generate quickly expertise reports which are part of my job	4.63	0.54
I can perform better and with more accuracy	4.54	0.58
I can complete my job tasks more quickly	4.51	0.55
I can attain quickly the needed information	4.48	0.59
I can make interpretations of my performance	4.45	0.61
My required knowledge level to perform my job has increased	4.42	0.58
My required ability level to perform my job has increased	4.41	0.61
My required skill level to perform my job has increased	4.41	0.58
The subjects needed to consult my chiefs have been reduced	4.33	0.65
My communication with my co-workers has been increased	4.28	0.65
I can participate in decisions about my job	4.28	0.63

Results revealed that all the items had mean scores above four and a standard deviation around zero point six. Therefore, it is possible to conclude that the integrated EPSS was considered as an effective system and improved the performance of the CSI officers in some specific determinants during the implementation period. From the table, generating expertise reports (M=4.63), performing better with more accuracy (M=4.54), completing job tasks quickly (M=4.51), and reaching needed information quickly (M=4.48) seemed to be major factors in which the performance improvement resulted.

Regardless of improving the performance of the CSI officers, the reduction in the number of consulted subjects to the chiefs (M=4.33), enhancement communication opportunities between officers (M=4.28) and participation in decisions (M=4.28) were the determinants providing less performance improvement.

4.4.1.5. Results

To explore the impact of the EPSS in terms of producing valuable results for the CSI Unit, the level 4 evaluation (results) data was gathered through the survey with 5 items. Therefore, this section addresses the following research question: "To what extent does the EPSS intervention help produce perceived valuable results for the CSI Unit??". In Table 4.16, the survey items relating to the results level were tabulated respecting mean scores.

Table 4. 16

The mean scores and standard deviations on the results items

Items **Using the EPSS in the CSI Unit, I believe that**	**M.**	**S.D.**
uniform workflow will be followed by all CSI sections	4.64	0.53
the quality of produced work and outcomes will be increased	4.58	0.54
productivity will be increased	4.57	0.54
paper documentation will be decreased	4.52	0.56
in-service training costs will be decreased	4.48	0.61

From the table, all items had almost mean scores above four point five and a standard deviation around zero point five. According to the officers, establishing standardization in terms of workflow procedures (M=4.64), increasing the quality of produced work and outcomes (M=4.57), and improvement of the productivity (M=4.57) were major valuable results that the EPSS produced during the implementation period.

4.4.1.6. Societal Benefit

The level 5 evaluation (societal benefit) data was collected through the survey to explore impact of the EPSS on the society. Therefore, the level 5 evaluation section addresses the following research question: "To what extent is the EPSS intervention perceived to have an impact on the society?". In Table 4.17, the survey items relating to the results level were tabulated with reference to mean scores.

Table 4. 17

The mean scores and standard deviations on the societal benefit items

Items **Using the EPSS in the CSI Unit, I believe that**	**M.**	**S.D.**
it will improve the institutional identity in the eyes of the citizens	4.59	0.55
it will help judicial authorities to reduce judicial procedures	4.42	0.59
it will help with reducing the time required for judicial decisions	4.41	0.59
it will help make positive contributions to the peace of the society	4.37	0.57

The CSI officers believed that using the EPSS would have a dramatic impact on society by improving the institutional identity in the eyes of the citizens (M=4.59). Moreover, they also admitted that the system would help to provide better forensic services and also help judicial authorities to reduce required procedures for the identification of both crimes and criminals (M=4.42). In doing so, the results showed that the time required for decisions would be reduced (M=4.41) and using the EPSS would have a positive impact on the peace of the society (M=4.37).

As a conclusion, while the CSI officers had an overall positive reaction, they thought that the workflow interface as an intrinsic support made a major contribution to their performance. Their support component's preference was educational materials for external support while information cards were the most preferred component for the extrinsic performance support. According to their responses, generating expertise report was the main factor for their performance improvement. In doing so, they believed that the use of EPSS would enable them to establish workflow standardization at all CSI Units. In their responses, the major impact on the society was as they expressed, that the institutional identity in the eyes of citizens would increase by providing better forensic services.

4.4.2. Qualitative Findings of the Evaluation

Qualitative findings of the evaluation phase of the study were composed of interview results conducted with twelve CSI officers from three different metropolises. The main object of the qualitative data collection process was to obtain in-depth information on the impact, effectiveness and perceived benefits of the EPSS. Like the quantitative findings, qualitative findings are discussed under the following respective levels: (1) reaction, (2) implementation, (3) behavior, (4) results, and (5) societal benefit.

4.4.2.1. Reaction

The first interview question was posed to understand respondents' reaction to the EPSS. In general, reactions to the implemented EPSS were very positive. To measure the reactions the EPSS has had on job tasks of the CSI officers six categories were identified (Table 4.18).

Table 4. 18

Frequencies of reaction categories

Kirkpatrick Level	Categories	Frequencies
Level I - Reaction	1. Professional development	10
	2. Different representation of the support	8
	3. Doing job well	6
	4. Communication	4
	5. Support structures	1
	6. Personal needs	1

In their responses to the question, almost all the participants in the study (n=10) indicated that the contribution to professional development an EPSS made was one of the reasons to react positively to the system. Results revealed that contribution to the professional development category was mainly cited in three situations: (1) technological contribution (n=5), (2) job related contribution (n=4), and (3) general comments (n=1).

As for the technological contribution sub-category, firstly, the CSI officers believed that technological devices should be used in their workplace, and the EPSS has partly provided these expectations. One police officer form the crime scene investigation section reported that,

> …Using technology is important for us. In the daily life, we use technology. Why do not we take advantage of using technology for our job tasks?. I think that keeping up with technology is a requirement for us. Using the new system [EPSS] is closing the gap now… [40].

Emphasizing the importance of the technology, another officer from the laboratory section pointed out that,

> …It [technology] provides great convenience to me. Moreover, I like using technology. I think that we should adapt today's technology to our job tasks and benefit from it. Therefore, I believe that this system [EPSS] is an advantage for our developments… [41].

Similarly, the officers reacted positively to the EPSS because it supported the new acquisitions related to job tasks. One interviewee from the biometrical data processing section pointed out that,

> …Before the new system [EPSS], writing expertise reports, and entering and comparing fingerprints had been assigned to different officers. I had only investigated the fingerprints. Using the EPSS, I entered the fingerprints to the system, and I investigated and found out the owner of the fingerprints. I am writing the expertise report now. This system enables me to do new tasks. That is why I think it is important for us… [42].

As the following excerpt stated by a deputy inspector demonstrated that the same attitude toward other EPSS components such as information panel and support portal was expressed by the participants.

> …While s/he is doing a job task, the information can be obtained from the system. Moreover, they [CSI officers] can analyze the support portal. Many contents have been embedded in the system. It is also possible to search. I think that these can make a contribution to the personal development of the performers… [43].

Secondly, qualitative results also showed that the different representation of the help contents (n=8) via different support structures were also mentioned by participants. One of the CSI officers from the laboratory section commented that "…*the formula of solution cannot be always remembered by experts. In case of this situation, individuals can use help contents, and remember the solution using different support structures* … [44]". Likewise, one other officer from the evidence preservation section reported that,

> …I like it [EPSS]. If somebody wants to improve oneself, this system will provide to do this…Everything is depended on the individual's preferences. In this system, opportunities are provided if the individual wants to contribute to his/her personal development… [45].

Thirdly, half of the participants stated that their reaction to the EPSS was very positive because of the fact that an EPSS helps them to do their job well (n=6). One of these respondents reported that "…*Writing an expertise report is important for our job. The EPSS prevents us from forgetting the missing parts in the expertise reports. This is one of the best opportunities that the system provides us*… [46]". Similarly, one other officer from the crime scene investigation section commented that "…*I do not spend time writing the expertise report. The report is created when I issue a command to the system. I like this feature of the EPSS*… [47]".

Lastly, the CSI officers stated that increasing direct communication between chiefs and officers, fulfilling personal needs, and accessing the support with different structures were other main reasons to react positively to the EPSS.

4.4.2.2. Implementation

Qualitative results revealed that components of the EPSS made a considerable degree of contribution to the officers' productivity. Table 4.19 depicts the frequencies of the specific EPSS types cited by officers through interviews. The CSI officers indicated that all components (intrinsic, extrinsic, and external) with varying degrees affected their productivity. The specific examples stated by the officers regarding the EPSS types varied according to the purpose of their needs.

Table 4. 19

Frequencies of implementation of the EPSS types

Kirkpatrick Level	EPSS Types	Frequencies
Level II - Implementation	1. Intrinsic	10
	2. Extrinsic	8
	3. External (Support Portal)	7
	4. External (Main Portal)	3

An overwhelming majority of CSI officers' responses (n=10) to the contribution of the EPSS types clearly indicated that intrinsic performance support made a major contribution to their productivity. This was illustrated well in the statement made by the officers from the biometrical data processing section:

> …To perform my job tasks, I use it [an intrinsic component] all the time. Anyway, the system shapes my job. Now, I am doing my tasks through the template. Moreover, performing step by step feature and message warnings for forgotten steps are the important specifications of the EPSS. Shortly, I shape my job according to the system. I mean I carry out my tasks together with the system… [48].

The following excerpt by the officer from the crime scene investigation section pointed out the function of the intrinsic support of the EPSS for their job requirements.

> …the system [an intrinsic support] follows our workflow in the crime scene investigation process. Without any missing parts, we can complete our

> investigation through the program. Especially, it is really good for generating reports without making any mistake [49].

As for the extrinsic support, the respondents (n=8) pointed out mainly the reminder function of the extrinsic support and different supports which were accessed by clicking '?' button. One of these respondents from the laboratory section reported that "…*By clicking a button, I can get short information regarding an analysis procedure or I have a chance to see which steps should be followed for doing an analysis method…* [50]". Likewise, another officer from the biometric data processing section commented "…*Especially, the help button ['?'] is useful to remind about the job tasks. I even used controlling my steps as to understand whether I follow the right procedure or not. That is why I can say that it [EPSS] is good…* [51]".

The same attitude toward external support (n=7) was expressed by the participants. The search features and accessing help contents via hyperlinks organized with reference to CSI sections and performance criteria relating to selected section were mainly cited by the officers. One officer from the evidence preservation section commented that,

> …the contents embedded in the system [a support portal] are important concerning our knowledge, ability and skills. In the system, you can find information about how to collect and package items of evidence. To illustrate, you can also learn how to conduct analyses and when the forensic evidence falls into disuse in the documents displayed in the system… [52].

Similarly, another officer working at the biometric data processing section pointed out that,

> …I think that this place [a support portal] should be used when there are not heavy workloads in the sections. There are many opportunities [support structures] in the portal. You click and get a support which you think will solve your problem related to your task. I can express that it is good because of the fact that it helps me to remember procedures. I know that I can find anything I need… [53].

Few officers (n=3) talked about the main portal as an external support regarding its contribution to their productivity. One superintendent from the administrative section commented its advantage in the following way:

> …It is really beneficial for our friends to share information in informal settings. For example, what you will do in any sabotage event or which evidence you will collect from the scene are the questions which they can share or find solutions in the portal… [54].

4.4.2.3. Behavior

Qualitative results showed that an EPSS was effective and improved the performance of the CSI officers. Table 4.20 presents the frequencies of areas in which the EPSS helps CSI officers to perform well. Interviewees emphasized that generating expertise reports (n=12), attaining needed information (n=11), and performing with more accuracy (n=9) were the most beneficial factors by which the EPSS enabled them to do their job tasks well.

Table 4. 20

Frequencies of behavior categories

Kirkpatrick Level	Categories	Frequencies
Level III - Behavior	1. Generating expertise reports	12
	2. Attainment of needed information	11
	3. Performing with more accuracy	9
	4. Increasing KSAs	4
	5. Communication with co-workers	2
	6. Participation in decisions	1

Firstly, all participants confirmed that they could quickly generate expertise reports which were the main outcome of the forensic process for all CSI sections. The importance of the expertise reports for the CSI Unit emerged the fact that the EPSS improved their performance by generating these reports automatically. An officer working at the laboratory section underlined the value of this feature in the statement:

> …For example, it is really good to generate expertise reports with the system [EPSS]. What I only do is to start the process. Then, I enter my investigation decision as the data to the system. Then, the system writes all the process. I only print the report and sign it. Lastly, I deliver the report to the relevant CSI section… [55].

An officer from the biometric data processing section stated the same argument in the following way: "…*The report [an expertise report] is generated automatically while you are entering the data instead of doing it manually. This feature enables me to spend more time on investigating more fingerprints in detail…* [56]". Likewise, another expert from the laboratory section commented that,

> …The most important advantage is that it [EPSS] simplifies our job by generating the expertise report and writing investigation methods automatically. I mean we do not spend time to write the investigation time and collected evidence, etc. It prevents a repetition. I think the best advantage is to get and print the prepared report quickly [57].

Secondly, the CSI officers expressed that the attainment of needed information was another beneficial task resulting in the improvement of the performance of the officers. Except for one, almost all of the interviewees (n=11) cited invariably that the EPSS helped them to enhance their effectiveness related to their job tasks by providing needed information. Results revealed that obtaining performance data used for interpretation of the performance (n=7) and accessing archives regarding past investigations (n=4) were two common factors believed as needed information which the EPSS includes. Emphasizing the advantage of obtaining performance data, one deputy inspector commented that,

> …One of the best features the EPSS provides is that we can monitor the whole workflow of the unit and the investigation processes. Moreover, we can also observe all correspondences between sections. These data make a major contribution to manage and evaluate individuals' performance… [58].

As for the officers' position, the main valuable results were obtained from the EPSS in terms of entering performance statistics and interpretation of the personal performance. The following excerpt commented by one CSI officer from the laboratory section demonstrates that,

> … When the data is used for performance management, we can learn how many job tasks are done, how much crime is committed, how much evidence is collected from crime scenes, how many fingerprints are found, and how many determined prints are matched with previous criminals. In short, we can obtain and interpret all performance data… [59].

Similarly, one other officer from the digital imagining section reported that,

> …I will do no extra things; rather I will do everything via the system [EPSS]. To illustrate, I will not compute performance statistics. I will not lose a lot of time. I will only enter the data and write my DVDs. Other required information is obtained automatically, and it can be screened easily… [60].

Besides generating and interpretation of the performance data, the participants pointed out that accessing the archives was another factor which made a contribution to their performance. One officer from the evidence preservation section reported that,

> …To show the impact of an EPSS on job performance, I say that I can find any evidence by clicking a search button in the system [an intrinsic support]. Indeed, I can find the location of the evidence which was sent ten days before to the relevant institution. This is the factor which increases my job performance… [61].

Another officer from the biometrical data processing section commented that,

> …Obtaining information about past investigations is very important. Now, I can do that. This feature makes me gain time for my job tasks. It is possible to trace any fingerprint collected from the evidence. This means that we can also

obtain any information about the a crime committed five years ago, and also get all digital data about the investigation processes of this event… [62].

Thirdly, results showed that performing with more accuracy was another determinant mentioned invariably through interviews. As the following example stated by a deputy inspector demonstrates, a great many officers (n=9) pointed out that they performed better their job tasks with fewer errors. "… *The system [an intrinsic support] shows you both what you are doing and the next step you should follow. You proceed with ensuring accuracy. The possibility of making mistakes decreases considerably*… [63]". Likewise, one officer working at an evidence preservation section commented that,

> …For example, if the crime scene investigation team collects three pieces of evidence and delivers to me two pieces only, I ask them immediately about the missing part. Because I can see the exact number from the system, this prevents us from making mistakes… [64].

Besides these three factors (generating expertise reports, attainment of needed information, and performing with more accuracy), the participants also indicated that the EPSS helped them to improve their performance by increasing their knowledge, abilities and skills (n=4), communication with co-workers (n=2), and participation in decisions regarding their job (n=1).

4.4.2.4. Results

Qualitative results showed that an EPSS produced perceived valuable results for the CSI Unit in some areas of job tasks. Table 4.21 presents the frequencies of areas in which the EPSS helps CSI officers to perform well. From the table, it is possible to assert that the most beneficial factors which the EPSS enable them to perform well so as to produce valuable results were providing standardization with regard to workflow applications (n=12), increasing productivity (n=8) and quality of produced works (n=6).

Table 4. 21

Frequencies of results categories

Kirkpatrick Level	Categories	Frequencies
Level IV - Results	1. Standardization	12
	2. Productivity	8
	3. Quality of produced works	6
	4. Documentation	4
	5. Training costs	2

First and foremost, all CSI officers stated that the EPSS will establish a uniform workflow for all CSI sections. According to their responses, standardization encompassed both job processes and major tasks followed by all CSI sections in the country. One deputy inspector commented that,

> …This system [EPSS] provides standardization over the country. It provides us to write uniform reports. This is a good outcome for us. If one crime scene investigator is appointed to a different province, s/he will never have a difficulty to adapt to the system… [65].

One other expert from the biometrical data processing section pointed out that,

> …If you are appointed to different provinces, you can encounter different applications for the forensic processes. This program [EPSS] will yield standardization. This is our major deficiency: standardization. This system will solve this problem… [66].

As for the forensic activities, the same officer continued to predict that,

> …Sometimes I have to write fifty expertise reports in one day. This task takes half of my time in the office. Moreover, we cannot write expertise reports all in the same quality because of the fact that we do not have the same abilities to write expertise reports. In addition, our reports also have to meet some standards, to illustrate; they should provide 100% accuracy. The standardization will be established… [67].

The same intention was emphasized well in the statement by an expert from the laboratory section: "…*This program [EPSS] will establish standards in the CSI sections via providing a "one system" and a "one report format". We are in a hurry to use the system*… [68]".

Secondly, a great many experts (n=8) expressed that productivity in the forensic services will be increased. One officer working at the laboratory section commented that,

> …Before the system; when we encountered an extensive crime; suppose that thirty pieces of evidence were collected from the crime scene. I had to write manually all these in detail in my report. Now, I can see collected evidence automatically. Of course, I can save time and analyze more evidence… [69].

Emphasizing a reduction in workload, one officer from the crime scene investigation section reported that "…*it [EPSS] simplifies my job. It increases my performance. If you consider my job as an input, it will increase daily tasks. However, I can say that it decreases my total workload*… [70]".

Thirdly, half of the officers (n=6) stated that the EPSS enabled them to produce high quality products. Related to simplifying workflow applications and procedures, and providing more accuracy, the CSI officers predicted that the quality of produced outcomes will be increased. The valuable results obtained through implementation period illustrated well in the statement stated by one deputy inspector:

> …produced tasks and outcomes should be in compliance with the regulations. What is our purpose? Collected evidence should be analyzed and delivered to the concerned authority. Therefore, the reports and other outputs should be of very high quality. Resolving the problem of making mistakes, the system [EPSS] will be very effective for our jobs… [71].

The same proposition was stated by the officer from the evidence preservation section in the statement:

> …workflow is really good. With this system [EPSS] we have not a chance to make so many mistakes. We are dealing with detailed tasks. There are lots of legal niceties. Therefore, the outputs should have zero error. Using the system, the quality of reports; for example, will be high… [72].

In addition to these factors, decrease in paper documentation (n=4) and training costs (n=2) was also cited by the officers as other valuable outcomes of the EPSS produced for the CSI Unit.

4.4.2.5. Societal Benefit

After the implementation period, the CSI officers believed that an EPSS will have an impact on society and the criminal justice system. Table 4.22 depicts the frequencies of perceived impacts that the implementation of the EPSS produced. Improvement of the institutional identity (n=10), simplifying and supporting judicial processes (n=9), and reducing the judicial time for decisions (n=8) were the most cited impacts in the interviews.

Table 4. 22

Frequencies of societal benefit impact categories

Kirkpatrick Level	Impact Categories	Frequencies
Level V – Societal Benefit	1. Identity	10
	2. Judicial process	9
	3. Judicial decisions	8
	4. Peace of the society	3

A significant segment of the sample of CSI officers (n=10) interviewed asserted that using the EPSS will enhance the institutional identity among the citizens. One officer from the crime scene investigation section commented that,

> …Citizens look at these efforts as technological improvements. Therefore, these efforts improve the public image of the police because they think that the officers use technological equipment while doing their job. Of course, we act

responsibly. However, they say that we investigate via the computer and they look at it with different eyes… [73].

Likewise, another officer working at the laboratory section pointed out that,

…It [EPSS] will be beneficial. To illustrate, citizens will think that we [the CSI Unit] are working with technology; therefore, there are no blanks in the criminal justice system. Because they will see that there are no disconnected steps, they might trust us more… [74].

Moreover, they believed that the EPSS will make quite an impact on criminal justice system in terms of simplifying and standardization of the processes (n=9), and also reducing the time required for judicial enquiries (n=8). Emphasizing on the standardization with reference to expertise reports, one laboratory expert stated that,

…While one province [CSI Unit] follows a procedure, another follows completely different methods. Now, we establish a standard. This so important that the first checked and read parts are expertise reports written by biometrical data processing, crime scene investigation and laboratory sections. The standardization relating to reports will simplify their jobs. I believe that this system [EPSS] will be very beneficial for courts and public prosecutors… [75].

One other officer from the biometric data processing section predicted that "…*The EPSS simplifies my job tasks. Similarly, courts and public prosecutors will also benefit from these improvements because of the fact that they will see more detailed and standard expertise reports* [76]".

As for reducing the time required for judicial enquiries, one deputy inspector stated that,

…In general terms, I believe that this system will speed up the judicial review processes. The most important one is the evidence process in the criminal justice system. A good deal of our time is spent for collecting, packaging, and investigating the evidence. The evidence chain is one of the important elements of the criminal justice system. Because our processes become fast, this chain will speed up evenly. This is the main impact. The courts and public

> prosecutors will have access quickly to the evidence information. Therefore, criminal cases will be solved quickly… [77].

Lastly, related with these benefits, few participants (n=3) expressed that the EPSS will also have a positive impact on the peace of society.

To conclude, qualitative results in coherence mainly with quantitative results admitted that the CSI officers' reactions were very positive to the new implemented system. Moreover, the major contribution to their performance was made by using an intrinsic support resulting in performance improvement for generating expertise reports and accessing needed information. According to their responses, while establishing standardization would be perceived as the major impact the EPSS provided for the CSI Unit, increasing identity and simplifying criminal justice system were the two main impact factors on the society that the system would influence positively. Summarized information about research questions, data collection methods, instruments, data analysis and major findings were presented in Table 3.23.

Table 4. 23

Summary of models, research questions, data collection procedures, sample size, instruments, data analysis, and major findings

Phases	I			II	III	
	Performance analysis	**Cause analysis**		**Design and Development**	**Evaluation**	
Models and frameworks	-	Gilbert's Behavior Engineering Model		-	Kirkpatrick's Four Levels of Evaluation and Kaufman's Mega Planning	
Research questions	What is the value of the CSI Unit's existing information to which the HPT initiative intends to contribute?	What are the root causes of the performance factors required to be improved to meet the goal of efficient and effective forensic services and activities offered by CSI sections?			Does the EPSS intervention as a performance improvement initiative achieve the impact, effectiveness and perceived benefits expected on individual and organizational performance?	
Data collection	Data review	Quantitative	Qualitative		Quantitative	Qualitative
Sample size	4 official artifacts	1176	22		191	12
Instruments	-	Survey	Focus group interviews		Survey, computer logs, checklist	Interviews
Data analysis	Narratives and frequencies	Descriptive statistics, confirmatory factor analysis, multiple regression	Document analysis (Frequencies and quotations)		Descriptive statistics	Document analysis (Frequencies and quotations)
Findings	• Vision – Mission Statements • Workflow • Educational Materials ▪ 138 support structures for extrinsic support ▪ 1015 support structures for external support • Educational Materials ▪ 36 performance criteria ▪ 69 performance criteria	I. Workplace • Information ▪ Relevant Guidance ▪ Communication ▪ Problem solving • Resources ▪ Reference Materials/Tools ▪ Standardization ▪ Documentation II. Competency • KSAs ▪ Required KSAs, training • Capacity ▪ Required capacity, practice, experience		Design and development of the EPSS	*Level 1: Positive Reactions* • Different representation of help contents • Professional development • Doing job well *Level 2: EPSS types contributing to productivity* • Intrinsic (workflow interface) • Extrinsic (support panel) • External (support/main portal) *Level 3: Improved performance factors* • Generating expertise reports • Attaintment of needed infotmation • Performing with more accuracy	*Level 4: Major valuable results* • Standardization • Productivity • Quality of produced works *Level 5: Perceived societal impacts* • Improving institutional identity • Reducing judicial procedures • Reducing decision time

4.4.3. Feedback to the EPSS and Revisions

Receiving feedback from the users is one of the important evaluation strategies to plan sustaining accountability of the intervention. Therefore, both quantitative and qualitative data collection methods were used to obtain performers' and experts' suggestions for the future improvements of the EPSS. As mentioned in the methodology chapter, open-ended questions, checklists, and interviews were the main source of the evaluation data.

Both quantitative and qualitative results revealed that although an overwhelming majority of CSI officers were satisfied with all the components and support structures of the EPSS, there were some revisions and suggestions needed to be applied to the system.

More specifically, 37 out of 191 participants responded to open-ended question presented in the survey. Two major categories emerged from their feedback and suggestions. While the first category was related to technological improvements, the second referred to the feedback of the visual design of the system. This result was also consisted with expert evaluations which were obtained by the checklists. Their evaluation results showed that the EPSS should be improved in two main areas: (1) navigation, and (2) functionality. That is to say, system's effectiveness and usefulness would be enhanced with increasing navigational features and functionalities of the components. Navigational items that two experts pointed out referred mainly to components' effectiveness which might be solved via technological improvements such as integration of new modules and new menus or pages. As for functionality, they asserted that officers' system usage performance might be enhanced via fulfilling user' needs. As for the qualitative part of the feedback and revision section, half of the experts (n=6) gave specific examples concerning future improvements of the EPSS. Their suggestions were in coherence with results obtained through quantitative parts of the evaluation section.

Firstly, technology related suggestions clustered around the infrastructure problems (n=16), processes (n=8), content (n=5), and procedures (n=4). These suggestions varied widely and changed according to the officers' job tasks performed in the specific section. To illustrate, according to the officers from the technical imaging, laboratory, and biometrical data processing sections, the major revisions were needed regarding evidence photography. Their suggestion was that a new module should be added to the system. Similarly, officers working at the crime scene investigation unit suggested that the PDA should be connected to the intranet without requiring office location and also a new module used for drawing sketches should be added to the system.

The same pattern concerning technology related suggestions was encountered in the qualitative results. Few officers (n=5) made very helpful suggestions concerning infrastructure problems of the system. One officer from the biometrical data processing section offered that,

> …Although I can read where the prints have been transferred in the expertise reports generated by laboratory section, I do not ensure and have a connection between the surface and prints. If I have a chance to see the photographs from the system, all the questions will be answered. I think it should be integrated to the system… [78].

The same suggestion was offered by one of these respondents from laboratory section in the statement:

> …I wish I could send evidence photographs that we investigate and develop. If they [officers from biometrical data processing section] can see the photographs digitally via the system, without waiting, I think it will be beneficial for them. This feature should be added, I think… [79].

Secondly, the major feedback and cited suggestions to the EPSS were clustered around the visual design of the system. Similar to the technology related suggestions, the expectations varied regarding the visual design of the EPSS (n=12). From the survey results, the most suggested design structure was color selections and menu design. The same feedback was received from the interview data. Half of the respondents (n=6) suggested that color preferences should be changed and some other options should be added to the system. One superintendent suggested that,

> …I cannot say that I do not like. However, the system [EPSS] may include more coloring sections. Menus and processes should be enlivened. Active elements and working menus may be seen in different colors. The system may be enriched with using more coloring… [80].

One other officer from the biometrical data processing section reported that,

> …I think that there is no need to add any additional option to the system [EPSS]. In general terms, I think that the system is good. Indeed, it seems to be perfect. Visual design of the system may be changed; however, it will be done later… [81].

In conclusion, the CSI officers' feedback and expert opinions revealed that the implemented EPSS was effective and it fulfilled main requirements of the CSI Unit. However, results also showed that some technological and visual design improvements should be done to upgrade the EPSS.

CHAPTER V

DISCUSSION AND CONCLUSION

5.1. Introduction

Following the flow of the Human Performance Technology (HPT) and other major models such as Gilbert's Behavior Engineering Model (BEM), Kirkpatrick's Four Levels of Evaluation, and Kaufman's Mega Planning Framework), this study addresses the analysis, design and development, and the evaluation phases of the integrated EPSS deployed by the Crime Scene Investigation and Identification Unit (CSI Unit) within the scope of the project. The purpose of this study stands mainly to review the organizational artifacts for identifying the CSI Unit's performance requirements and existing information; to identify and prioritize the contributing causal performance factors required to be improved to meet the goal of efficient and effective forensic services and activities offered by the CSI sections; to design and develop an EPSS and components of the EPSS; to report the summative evaluation findings of an initial implementation to investigate the impact, effectiveness and perceived benefits of the EPSS on the performance of CSI officers.

5.2. Discussions of Findings

The findings are discussed in order to be made compatible with the main phases of the study and research questions presented in the previous chapters. The section begins with a discussion of performance analysis and cause analysis results forming the analysis phase in the light of Gilbert's BEM. Next, the main functions and features of the components and structures of the integrated EPSS are discussed. Finally, the section concludes with a discussion of summative evaluation results conducted after the initial implementation of the EPSS.

5.2.1. Analysis

The analysis phase of the study consisted of two separate steps: (1) performance analysis, and (2) cause analysis. The findings are discussed below within these phases.

5.2.1.1. Performance Analysis

To get the whole picture of the CSI Unit; firstly, a performance analysis was conducted by investigating vision and mission statements, rules and regulations, materials, and performance criteria. Although the results of this analysis could be presented in a narrative format instead of descriptive or quantitative, the results provided valuable outcomes for the successive phases of the study.

Firstly, vision and mission statements of the CSI Unit guided the researcher through the evaluation phase of the study. More specifically, the statements designated by regulations put much emphasis on combating all national and international crimes by providing forensic services to help the criminal justice system. This approach encompasses both the societal side of the activities and investigation units' decision. Indeed, this direction also pointed out the expectations for the CSI Unit. Therefore, Kaufman's Mega Planning framework was added as a part of the evaluation phase to determine the impact of the intervention. As Watkins (2007d) suggests that the first step in any performance initiative should begin with determining the organization's performance expectations regarding worthwhile results to be achieved at not only organizational and individual levels but also at the societal level. Moreover, besides giving directions for all the steps of the study, vision and mission statements established a framework of evaluation for the EPSS. As Chyung (2008) states that the four levels of evaluation should be linked to the levels of objectives of the program. Indeed, organizational goals, performance objectives and other related objectives should be clearly reported before conducting four-level evaluations.

Secondly, workflow processes followed through the CSI Unit for forensic activities were ascertained that the main framework of the intervention would be based on the results of these systems for each CSI section. After analysis, how the job tasks were performed and in what sequence they were followed were revealed so as to show the background of the CSI Unit. As Robinson and Robinson (2006) assert that having determined the mission and vision of the organization, the workflow process should be analyzed. Results also revealed that the workflow of the CSI Unit started with notification of the crime and ended with the deliverance of all investigation results to the public prosecutors. Therefore, the intervention aimed to improve the organizational performance of the CSI Unit should have involved and covered all the steps required for the investigation processes.

As a third analysis component, support structures generated from the printed materials were also analyzed both as extrinsic and external supports. Although these structures were created through the project, they provided valuable resources for officers with attainment of help contents via different formats. Moreover, the results showed that 118 support structures as an extrinsic performance support and 1015 support structures as an external performance support were embedded in the system. The difference resulted from the fact that extrinsic support structures were developed to be accessed while the officers were performing their job tasks; therefore, it was not possible to integrate all the help contents into the system. Rather, all the help contents via these structures were displayed in the external support so as to be reached by officers whenever needed. Moreover, forensic processes and activities involved many descriptions, steps, definitions, and applications. Therefore, it was also reasonable that the EPSS consisted mainly of support structures containing more information such as information cards, educational materials and tips. Moreover, some sections' job tasks such as laboratory and biometric data processing were based mainly on procedures; therefore, coaches and checklists, and also process maps were given place to the system.

Lastly, similar to printed material analysis, performance criteria provided a valuable range of applications for the CSI officers including specific job tasks. As Gilbert (2007) asserts that as long as properly used, performance criteria can constitute a framework to measure potentials to improve the performance of the people, groups or organizations.

Therefore, both personal and organizational performance criteria for each CSI section were used through the phases, most notably during the design and development phases of the intervention. As Swanson and Holton (1999) suggest that using the performance criteria is a sine qua non condition of implementing the intervention because they represent the quality features of the improvements in performance. Moreover, as discussed in the evaluation phase, the subject criteria provided valuable information for performance management and monitoring. These results confirmed the theoretical argument that performance indicators can be used for collecting evidence and information to form a performance data for the future (Marrr, 2008). Especially, key performance indicators showed practitioners what the organization have done and what they should do to increase performance (Parmenter, 2010). Therefore, they should integrate the performance system for recording, displaying and analyzing data (Armstrong, 2009).

As a conclusion, the elements, vision and mission statements, workflow processes, materials, and performance criteria covered through the performance analysis made a major contribution to successive phases.

5.2.1.2. Cause Analysis

The identification of the root causes of performance factors is crucial to any performance improvement initiative's success. As Watkins (2007d) argues that although performance is vital to the success of performers, teams, organizations and communities, all performance such as organizational and individual characteristics is not worth improving. Therefore, the systematic cause analysis of the performers and organization is one of the required steps for the performance initiatives. The diagnosis offers prescription, design, development, implementation and evaluation of determined and selected interventions (Stolovitch & Keeps, 1998). Gilbert's BEM was selected as a framework of the cause analysis because it is used to determine the causes of performance factors in order to identify possible interventions that improve performance regarding two identified factors, associated with the performer and environment (Medsker, 2006; Sala, 2003).

In this study, quantitative results, firstly, revealed that the main root causes of performance factors were found in two main categories: (1) workplace, and (2) competency. In other words, the workplace and the competency were two basic influences on human behavior impacting the performance improvement initiative, and more specifically, these factors predicted a perceived organizational performance of the CSI Unit. These findings support Gilbert's (2007) BEM that environmental support and the person's repertory of behavior are the two main components which should be used as variables affecting the workplace performance. Similar to Gilbert's framework, the workplace factor corresponds to one's environmental component while the competency factor corresponds to a person's repertory of behavior element. In this study, quantitative results also disclosed that the workplace issues have more influences on organizational performance of the CSI Unit than the competency related performance areas. This finding confirmed the theoretical argument that only 10% to 20% performance improvement possibilities depend on the behavioral repertory of the individuals; the vast majority of the opportunities reside in the environment (Cox et al., 2006). Therefore, it was necessary to select the intervention(s) that would alleviate or address mainly the workplace and also the competency performance issues.

More specifically, different from Gilbert's (2007) framework where the environmental support consists of three components (data, instruments, and incentives), the qualitative results revealed that the workplace factor were clustered in two areas: (1) information, and (2) resources. No deficiencies were detected regarding incentives. This result might explain the situation that the CSI Unit is a governmental, centralized, and hierarchical organization. These two factors are tied to the work environment or elements external to the CSI officers. Information as a first category captured primary influences on officers' performance by way of workplace environment, including the subcategories of relevant guides, communication, problem solving, and participation. Similarly, standardization, reference/materials and tools, and documentation embodied in the second category of the workplace factor were labeled as resources. These findings are consistent with the other theoretical assertion that needed resources such as equipment and materials related with the job requirements should be available in the work environment at a proper place and time because the availability of these resources might affect the performance of individuals and organization (Desautels, 2006). In general terms, the distribution of insufficient resources and providing poor quality resources might result in performance deficiencies in the organization (Van Tiem et al., 2004).

As Rosenberg (1990) asserts, individual performance takes part at the beginning of the any performance improvement initiative to improve human performance and productivity in any organization. Taking the performers' characteristics into account, qualitative results also showed that the competency factor was clustered in two areas: (1) KSAs (knowledge, skills, and abilities), and (2) capacity. Like the workplace factor, the competency component differed from Gilbert's (2007) framework which is based on the premise that a person's repertory of behavior consists of knowledge, capacity, and motives components. These two determined factors were directly related to CSI officers' personal repertory of behaviors, most notably their knowledge, skills, abilities, and capacity. In the study, no deficiencies were detected with regard to the motives component as Gilbert (2007) proposed. Similar to the workplace factor, this result might be explained with CSI Unit's organizational structure; that is to say, being a governmental organization and having a hierarchical structure might play a vital role in this issue. These findings supported the idea that knowledge and expertise were the two elements on which organizations depended; and they required employees to be able to do their job and perform (Swanson & Holton, 1999).

To summarize, contrasting with the competency factor related to officers' repertory of behavior, the work environment external to the officers plays a prominent role in fulfilling the goal of efficient and effective forensic services and activities. Moreover, this phase also confirmed that any consideration about human performance involves organizational performance (Rothwell, 1996, 2005). In other words, individual performance is related to the organizational performance. Rothwell (1996, 2005) continues to assert that organizational environment subsumes other performance levels such as the worker, work and work environment and has the greatest influence over them.

In the study, both quantitative and qualitative methods were deployed to determine the root causes of performance factors for the CSI Unit. Following and complying with scientific traditions; however, the findings might include some probabilities. As Brinkerhoff (2006) offers, practitioners should take a risk, as some degree of uncertainty, in their analysis of causes of performance problems because human behaviors can be understood in some degree, not as absolute. Therefore, the decisions should be based on probabilities, not certainties (Brinkerhoff, 2006). Although the findings presented in the study were grounded in the scientific procedures, the suggestions regarding the intervention's framework were made in the light of this argument.

5.2.2. The Intervention (EPSS)

In the study, aligning with the root causes of performance factors, an integrated EPSS was designed and developed to improve the performance of the CSI Unit. In general, any information technology investment is correlated positively with the organizational performance (Nel, 2008). The main function of the EPSS was to provide direct performance support concerning work processes and process support via different sets of components. Therefore, three types of EPSS (Intrinsic, Extrinsic, and External) were integrated to the system via different support components such as workflow application interface and support portal so as to enable CSI officers to get demanded performance support whenever needed.

5.2.2.1. Selection

Appropriate EPSS types and system components were designed according to the analysis results conducted before the intervention phase. The selections and decisions were made in accordance with performance analysis results. This procedure is consistent with both theoretical and practical arguments which were offered by the practitioners. To illustrate, the decision on appropriate interventions should be explored after determining the performance gap, and its underlying causes, means or opportunities and reviewing all the documents including vision, mission, values, criteria and goals of the organization so as to align them with accomplishments (Pershing, 2006a; Rothwell, 1996, 2005; Watkins, 2007a).

Taking the analysis results into account, an EPSS seemed to be a proper intervention for the CSI Unit and officers because of the fact that the root causes of performance factors with reference to both the environmental support and the officers' repertory of behaviors were detected. As Rosenberg (2006) states, if the performance analysis results indicate that there are lacks of developing skills, delivering knowledge or information, and supplying support in the workplace, the performance support will be the primary set of solutions. The same theoretical argument was cited by different researchers. To illustrate, according to Nguyen and Woll (2006), an EPSS might be a proper intervention when the root causes of performance deficiencies in organizations are the lack of environmental supports, most notably information category. Similarly, McKay and Wager (2007) state that, as long as there are performance deficiencies regarding the lack of sufficient knowledge; the designed EPSS should include computer-based learning experiences.

5.2.2.2. EPSS Types, Components and Support Structures

Even a brief review of the literature reveals that Gery's (1991) proposition to the EPSS levels (types) has been expanded. While her classification (intrinsic, extrinsic, and external) still exists, many researchers and practitioners have made major contributions to her framework. To illustrate, Nguyen (2010), Rossett and Schafer (2007), Ruyle (2005), and Van Tiem et al. (2001) try to elucidate the EPSS types or define new classifications in their researches. In the HPT field; however, the practitioners have not reached an agreement regarding the usage and application of the EPSS levels (Cavanagh, 2004).

There are many EPSS attributes to be embedded in the system. As Gery (2002) states that these characteristics can be implemented at different degrees and should be embodied in the integrate system thus achieve greater benefits in terms of both individual and organizational performance. To develop such a system, the intrinsic, extrinsic and external support systems were integrated for the CSI sections.

As for an intrinsic support level, the workflow application interface application was the most important component of the integrated EPSS. As aforementioned, it was designed and developed to follow task structuring characteristics of the CSI Unit via work processes, procedures and workflows of the CSI sections. This feature incorporated many causal performance factors, most notably the workplace and its sub-categories tied to the work environment or elements external to the CSI officers. Covering the environmental factors, the workflow application interface would be one of the success criteria of the system. As Nguyen and Hanzel (2007) emphasize, the more an EPSS (intrinsic or extrinsic) is integrated highly into the work space, the more desired results will be ensured for improving individual and organizational performance. Indeed, some tasks such as generating expertise reports and recording performance data were deployed independently of the officers' actions. Stone and Endicott (2000) state that the user interface of the EPSS should be unambiguous and invisible while coordinating cognitive structures of the users and procedures used on the job tasks.

The importance of fulfilling performance issues resulted from the environment is cited by many researchers. To illustrate, Chevalier (2006) points out that environmental factors that lead to a negative performance take priority over individual factors in that individual factors cannot be changed unless negative environmental factors exist in the work environment. In other words, it is impossible to improve human performance in any organization as long as the causes of the performance problems result in environmental factors, even if individual factors are the source of these deficits (Dean et al., 1995; Rothwell, 1995).

Another distinctive feature of the workflow interface was that of being designed and developed to link other components of the EPSS. As presented in the intervention section of the methodology chapter, extrinsic and external components of the system (support panel, support portal, and main portal) could be accessed by using the interface. This attribute enables CSI officers to get and reach help contents using with the support panel or support portal. It was absolutely vital that both the integration among components and the successful access to the help content were provided for fulfilling the workplace and competency related issues. As Humphress and Berge (2006) assert, one of the important performance problems resulting from the lack of information and data is about how performers get the right information at the right time to perform the desired levels.

On-demand access to all resources and tools so as to find solutions concerning job tasks was performed via either extrinsic support (support panel) or external support (support and main portals) components. These components incorporated causal performance factors, most notably the competency tied to the repertory behavior of the CSI officers. Covering the individuals' repertory behavior, the support panel, and the support and main portals addressed mainly the competency factors and its sub-categories by providing officers help contents concerning the job tasks whenever needed. This feature was important for them to perform well in their job tasks. As Gery (1991) points out that providing support to the performers whenever needed is so important because they can only formalize the cognitive components provided by the system with a nominal endeavor and rehearsal at that time. Therefore, the help contents were embedded in both the support panel (extrinsic support) and the support portal (external support) with different support structures such as information cards, coaches and checklists, and educational materials. The main purpose of these support structures was to allow the CSI officers get performance support by selecting appropriate types of the help content. They could prefer reading a small set of facts or hints, or following step by step instructions, etc. These opportunities enabled them to receive easily the performance support with the preferred types of help content.

The integration of the support components, especially for the external support, was provided in the design and development phase of the system to be accessed easily. This approach is consistent with those of Nguyen (2010) who supports the idea that in case of an integrated EPSS design, it should be linked and integrated directly into the work interface. If the external support is provided, the performers' EPSS interface should include a link to launch the external support system. Concerning this characteristic of the component, some other practitioners express that providing a link to access the external support in the system as a help button or as a help index may be helpful for the performers' efficient usage of the EPSS (Nguyen & Woll, 2006). The bottom line is that great performance support determines and distributes the help by which performers really need to do job well (Rossett & Schafer, 2007).

To summarize, the integrated EPSS was designed and developed to improve the performance of the CSI Unit aligning with their extant data and prioritized performance factors. As a matter of fact any employee development program trying to make positive contributions to employees for performing better on their job tasks have a positive impact on organizational performance (Jacobs & Washington, 2003). The selection of intervention types, components and structures were based on the results obtained from the analysis phase. As Schwen et al. (1998) assert that the concepts of data, information and knowledge can be integrated and extended via designing and developing an EPSS that includes accessing to a wider set of appropriate interventions.

5.2.3. Evaluation

After the initial implementation of the EPSS, the summative evaluation of the intervention was conducted. As cited invariably in the literature, summative evaluation is designed to understand immediate user proficiency and intervention effectiveness (Dessinger & Moseley, 2006; Van Tiem et al., 2006). Therefore, the major purpose of the evaluation phase was to investigate the impact, effectiveness and perceived benefits of the EPSS on the performance of CSI officers based on Kirkpatrick's Four Levels Model and Kaufman's Mega Planning framework. To understand the successfulness of the implemented intervention (EPSS), four levels of evaluation as well as mega planning framework for the fifth level were selected as the evaluation and effectiveness strategy. As Bichelmeyer and Horvitz (2006) state that level-based evaluation models are efficient when the aim is to evaluate the overall effectiveness of an intervention and to reach summative judgments on the performance-improvement initiatives. In general terms, both quantitative and qualitative results revealed that the integrated EPSS produced desired and positive results for the CSI Unit.

More specifically, results revealed that the EPSS received generally positive reactions from the officers (Level 1). After implementation of the intervention, reactions to the specific EPSS features and the acquisition of job performance related benefits might have established these positive behaviors. As Gery (1991) states, assessing the reactions of the performers and impact may be important at early phases of the EPSS utilization.

As for the Level 2 evaluation, both quantitative and qualitative results showed that an intrinsic support component, the workflow application interface, made a major contribution to the officers' productivity. That is to say, an intrinsic support made more contribution than other levels such as an extrinsic support (support panel) and an external support (support and main portals). This finding was consistent with those of Nguyen (2005) who found that intrinsic or extrinsic performance support system was considered as more useful than other levels. It might be considered as an acceptable result for several reasons.

The first reason was that the workplace interface was designed and developed according to the analysis results which addressed the importance of the environmental support as a root cause of the performance factor. Because the interface application interface fulfilled the needs of performance issues resulted from the environmental support, the officers believed that an intrinsic support made much of a contribution to their productivity. This result also supported the theoretical premise that focusing attention on information, resources, incentives (environmental factors) in any performance improvement initiatives has a greater impact on the human performance than addressing motives, capacity and knowledge (individual factors) (Chevalier, 2006).

The second reason was that the work interface designs simplified many of the officers' job tasks and helped them to perform well. The integrated feature of the system enabled CSI officers to complete the required job tasks as well as to receive the needed help contents via extrinsic or external support structures. This finding also confirmed the research results of Nguyen (2006), and Nguyen and Woll (2006), who express that the EPSS is most effective and efficient when it is implemented directly compared to integrated types of EPSS, in the context of the work environment. Another interpretation of this result was that not only external but also extrinsic support components had to be activated to receive the performance support. Therefore, these components required the officers to make extra efforts to get help contents. As Nguyen and Hanzel (2007) assert that because the external support includes more content in the database, it is possible to assert that finding and selecting the relevant support content may be more difficult for performers.

As for the support structures' preferences, the performance data revealed that support structures which included specific information and knowledge regarding job tasks were preferred by the CSI officers for both external and extrinsic supports, most notably educational materials and information cards. These preferences might be explained well in that crime scene investigation processes for all CSI sections consist of detailed procedures and many steps. Therefore, the reminder feature of the systems and small pieces of information about job tasks might be beneficial for them to complete their duties. Besides information cards and educational materials, coaches and checklists, and process maps were also preferred by officers when they needed to get any help content. These preferences were also reasonable in that the step by step instructions and visual representations of the job tasks might be considered beneficial to perform well. As Nguyen (2005) state that the more visuals (diagrams, processes and so on) for navigating to assist support content are used in the EPSS, the more employees find the system useful.

The Level 3 of the evaluation framework measured the perceived benefits of the EPSS concerning the performance improvement of the CSI officers. Both quantitative and qualitative results revealed that their performance improved in some specific areas. That was very important for the successfulness of the intervention. As Brethower (2007) states that improving performance as a process is more difficult and much more priceless than only changing it. If these areas are scrutinized closely, it is possible to assert that the main determinant was the intrinsic support component, the workflow interface. Generating expertise reports, attainment of the needed information, and performing with more accuracy as perceived benefits might be considered as one of the main outcomes of the workflow interface application. This result supported the argument obtained from Level 2 evaluation. As aforementioned, the intrinsic support type was the most preferred component of the EPSS. Therefore, it was understandable that the CSI officers' perceived benefits of the system were closely related to the workflow interface. Moreover, this result was also consistent with the theoretical arguments stated by different HPT researchers. As Bastiaens et al. (1997), Lessard and Mowat (1998), and Van Tiem et al. (2001) state, the EPSS provides employees with immediate access to the most recent procedure, data and required information. Similarly, Altalib (2002), Gery (1991), and McKay and Wager (2007) express that the

EPSS reduces errors and mistakes because all available support and information can be accessed immediately whenever needed. Besides an intrinsic support, the CSI officers believed that their performance improved in individual domains related to the competency factor addressed the repertory of behaviors, most notably knowledge, skills, and abilities. Similar to an intrinsic support, this result evolved from the preference and usage of the extrinsic and external performance support components. These results were consistent with the other theoretical and practical assumptions that the EPSS increases the job productivity (Altalib, 2002; Chang, 2004; Van Tiem et al., 2001), enhances the worker's autonomy (Altalib, 2002; Chang, 2004; McGraw, 1994b), improves knowledge capitalization (Altalib, 2002; Brown, 1996; McGraw, 1994a; Van Tiem et al., 2001), and provides employees with immediate access to the most recent procedure, data and required information (Bastiaens et al., 1997; Lessard & Mowat, 1998; Van Tiem et al., 2001).

As for the Level 4 evaluation, the results showed that all EPSS components produced valuable results for the CSI Unit. One of the main valuable results of the EPSS was that it provided the standardization. As many researchers and practitioners assert that the EPSS helps employees accomplish frequently repeated job tasks and procedures automatically and uniform work practices (Altalib, 2002; Brown, 1996; Moseley & Dessinger, 2007; Rosenberg, 2006; Van Tiem et al., 2001). Although the standardization pointing out the importance of the workflow interface came to prominence in the both quantitative and qualitative data, it seemed that other components, the extrinsic and external supports, played a vital role in the eliciting of valuable results such as productivity and improving the quality of work. The CSI officers believed that the EPSS have an impact on the CSI Unit's organizational outcomes. These results confirmed the theoretical proposition that any performance improvement initiative can be successful and effective if only the selected performance support solution focuses on the performance outcome (Rosenberg, 2006).

The Level 5 of the evaluation framework measured the impact of the EPSS on the society. Most of the CSI officers participated in the study predicted that the EPSS would increase the institutional identity in the eyes of the citizens, simplify and support judicial processes, and also reduce the judicial time for decisions. These results were credible for the reason that the CSI Unit offers forensic services for the identification of both crimes and criminals by scientifically examining and interpreting physical evidence collected during the crime scene investigation. The officers' great emphasis on citizens' possible benefits, the Unit's repetition, and criminal justice systems' possible advantages were considered as the outcomes produced by the EPSS beyond the organization, and as the major contributions made to the community.

5.3. Implications for Practitioners

The discussion of findings has theoretical, practical and methodological implications for the HPT practitioners. More specifically, the findings draw our attention on how a performance improvement initiative can be planned, deployed, and evaluated using the HPT model, and other major models of the field. In general terms, this study provides implications related to the HPT principles and models, design and development of performance support, and evaluation of the intervention.

Using and following the major models, the findings of the study contribute to a growing scientific HPT research and practice. Modeling in HPT as a part of systemic and systematic approaches plays a pivotal role in the conceptualization of complex activities in a way that it visualizes and communicates whole processes with logic to other components (Wilmoth et al., 2010). Although no developed models are perfect in the field (Rothwell, 1996, 2005), models in HPT provide blueprints for guiding performance improvement initiatives by directing practitioners about how to analyze, design, develop, implement and evaluate. Therefore, practitioners should select and utilize appropriate HPT models as the baseline of their research studies.

To illustrate, many models have been developed by the practitioners about how to conduct the analysis. Indded, Enos (2007) and Van Tiem et al. (2006) acknowledge that focusing on the analysis is the most essential attribute for the HPT field. However, Silber and Kearny (2006) ascertain that HPT practitioners could answer only fewer than 10 percent of the simple business questions about the organization. Individual and organizational behaviors are affected by different kinds of complicated factors. Although some of the drivers can be manipulated with HPT efforts, there are also some other factors in organizations that may not be known regarding answering questions related to their implications. To illustrate, what are these things' causes and influences over the organization and how do they interact with each other are the main important questions for the factors having little knowledge and little control about (Brinkerhoff, 2006). This accounts for the fact that some components and elements of the causes of performance problems are still an enigma.

Almost all diagnostic analysis models represented in the literature challenges us to consider that only one or two factors affecting workplace performance are related to training. Gilbert's BEM supports practitioners in the first look to diagnose performance-related deficiencies and to start by correcting the obvious obstacles (Gilbert, 2007). However, as Rothwell (1996, 2005) states, the main difficult step is to determine how to categorize performance components into six factors of the BEM model. Therefore, researchers should select appropriate research designs which reveal performance factors. They should use all methodological instruments in a way that determined causal performance factors might direct all the performance improvement initiatives.

Besides cause analysis, analyzing organizational extant and intrinsic data is also vital for it allows researchers and practitioners to understand a complete perspective about the organization. In that manner, official materials such as policies, mission and vision statements, regulations, hard performance data (if available), and also workflow of the job tasks should be included in the research phases. These documents and values can be used for other research processes, most notably design, development, and evaluation of the intervention. As Rossett and Schafer (2007) state, effective performance support is contingent upon succeed in important organization objectives.

Following the analysis phase, the researcher should select an appropriate intervention package and its components. As Brinkerhoff (2006) notes HPT practitioners should proceed quickly to decide and implement appropriate interventions after the completion of the analysis of needs. More specifically, the selected mix of performance technologies should connect with the contributing factors which were determined in the analysis phase. As for the selection of the EPSS as an intervention, the first step for designing an EPSS is to determine the performance gaps (Stone & Endicott, 2000). Therefore, the researchers should obtain justifiable data using different data collection methods. Villachica et al. (2006) support the idea that an EPSS should be used if the organization has multiple performance gaps and multiple interventions are needed to solve these gaps. This recommendation points out the fact that if the organization has the current and desired performance data, the researchers should also conduct a gap analysis to reveal the exact requirements of the organization.

After selection of the EPSS, the researcher should also determine the structural patterns of the system. The findings of this study pointed out another important implication that might be beneficial for the researchers. The components of the EPSS and the integration of the structures should be designed properly. The analysis results provide valuable inputs for researchers. To illustrate, the workflow of the job tasks should be taken into consideration. Unless the EPSS matches with the natural workflow of the job, the employees may have problems with the adaptation of the system. As Villachica et al. (2006) warn that the user interface that follows the workflow strengthens the use of the system. They continue to say that the user interface should match the nature of the work flow so that novice training and ease of use can be reduced. That is why the screens, windows, fields and the logic of the EPSS should be identical to the work flow of the job.

The discussion of findings has also an implication for the HPT practitioners concerning the evaluation of the EPSS. First and foremost, as Marthandan & Meng (2010) challenge us to consider that a proper evaluation method should be selected before making any technological investment. Under the light of the findings; therefore, the practitioners should employ sophisticated performance and cause analyses in order to select appropriate evaluation methods of the performance initiatives. Although Marker et al. (2006) claim that the general consensus on how the levels should be utilized for non-instructional interventions has not been so clear in the field, the findings referred that the Kirkpatrick's model might be selected and utilized for the evaluation of the non-instructional interventions such as an EPSS. In general terms, Kirkpatrick's model can be utilized as formative or summative purposes (Dick & Johnson, 2007). Therefore, the researchers should plan carefully the evaluation levels if they decide to use Kirkpatrick's model. As for Kaufman's Mega Planning framework as an integration of Kirkpatrick's model, the evaluation findings pointed out that if the organization and the planned performance intervention allow researchers to evaluate the societal impact, it might be selected and employed in the evaluation method. Chyung (2008) states that Kaufman's organizational elements model can be used as an evaluation tool in accordance with Kirkpatrick's four-level model of evaluation (Chyung, 2008). It can be used either coordinately with the organizational elements model or independently as a framework for real and ideal circumstances (Burner, 2010). Regardless of Kirkpatrick's Four Levels of Evaluation model and Kaufman's Mega Planning framework or other models used, the evaluation results should be based on scientifically obtained data. As Spitzer (2007) states, the evaluation should be based on good measurement data in order to be objective.

Lastly, this study provides methodological implications for the practitioners regarding the HPT principles and models. As HPT is an evolving field, there are no exact prescriptions for how to do HPT (Pershing, 2006a). Indeed, there is no single definition of HPT model (Main, 2000). Because the researches should have scientific basis on their research studies, the models and principles of the HPT field might provide a solution to be deployed. As Binder (1995) points out that the scientific methodology and standard guidelines should be followed in any performance initiative by practitioners so that the field can be built on a much stronger foundation (Binder, 1995).

5.4.Recommendations for further Research Studies

This study includes the major phases of the any performance improvement initiative such as performance and cause analysis, design and development of the intervention (EPSS), and evaluation to which the general HPT model refers. Therefore, the methodology and other models used in the study will be encouraging in order to both expand and refine the field's literature. As Ferond (2006) suggests that there is a need for researches that focus on HPT's capability to maximize organizational potential.

In many models, organizational variables are ignored owing to putting much emphasis on considering individual performer results (Amarant & Tosti, 2006). Therefore, the organizational and individual variables concerning performance perspectives could be investigated sensitively using the models such as Gilbert's BEM. Taking organizational performance, private or governmental, into consideration, more studies should be carried out to determine major performance factors. As Gilbert (2007) offers, to determine the organization's total performance, there is a need to investigate several aspects of the performance because performance situations are so multidimensional and a composite of the multilevel in the organization. In that sense, analysis of the organization, individuals, and also workplace become important for the carried out researches. Addison and Haig (2006) argue against the tradition common in HPT that most of the performance-improvement initiatives have been conducted through stating the desired results firstly, and then analyzing the inputs. Rather they continue to add that organizations should be considered as a complete system. Moreover, the performance-improvement plan should be conducted through inputs to results because performance occurs within the same sequence.

Gilbert's BEM was used in this study to determine the root causes of the performance factors of the CSI Unit. Although many analysis models have been developed in HPT and selection of the appropriate analysis model is challenging, Gilbert's BEM is the most prestigious and used cause analysis model in the field (Marker, 2007). The BEM's popularity and appealing characteristics result from its intuition, simplicity, and adaptability to many different workplace environments (Crossman, 2010). In this study, the contributing performance factors were determined with reference to the BEM's levels. Although both environmental support and repertory of behavior factors with different labels emerged from the analysis of the data, the interactions between these factors could not be investigated. As Chyung (2005) states, although existing literature represents an effective usage of the Gilbert's model, there is a need to study his idea of diffusion of effect. Future research; therefore, should include testing the effects of the BEM's six key vantage points for organizational cause analysis.

In this study, the results of the analyses were used as an input for other steps of the performance initiative. Apart from the evaluation phase, they informed the design and development of the EPSS that pointed out specific environment and personal performance variables. As Ruyle (2005) advises, logical arguments for the adoption of EPSS technology should be phrased before the design and development of the system. Although many frameworks have been offered for the selection of appropriate interventions, one subject that remains to be explored is how to choose the best intervention package to fulfill the performance gaps of the organizations. The same proposition is valid for the EPSS. Although the levels and components of the EPSS were designed and developed with respect to analysis results in this study, the exact design should be depended on more hard performance data. The existing EPSS literature shows that descriptive and prescriptive studies found on narrative evidences constitute the majority of the researches in the field (Mao, 2004). Therefore, future researches should include propositions based on the scientific and hard performance data while the types and components of the EPSS are selected to fulfill performance gaps.

In recent years, there is a growing inclination toward the use of EPSS in the business and industry to improve human performance within the workplace (McKay & Wager, 2007). In this study, the integrated EPSS was employed in computers for all CSI sections and officers and also in PDA's for the crime scene investigation sections. The implementation and evaluation of the study were limited to these technologies. For further studies, new technologies should be integrated to the main systems and the effectiveness and impact of the components should be investigated in detail. To illustrate, as McKay and Wager (2007) express, while performing their job, employees have a great chance to access electronic support via wireless and mobile technologies. New technologies may also play a key role in the widespread usage of the EPSS in the future. Voice recognition, wireless, and mobile technologies and LCD panels, different multimedia options for delivering the content may direct the evolution of the EPSS (McKay & Wager, 2007). These technologies' capacity and efficient usage of the system components should be carried out. More specifically, the success and efficiency of the extrinsic and external support components should be investigated with reference to new technological equipment.

The same paradigm shift is also valid for the evaluation of any intervention. First and foremost, it is apparent that evaluation studies have been favored in the HPT field. Indeed, as Pershing et al. (2008b) offer, evaluation and measurement should be included in HPT's research agenda for the future. Similar to the analysis, many models have been developed by researchers to conduct evaluation of the implemented interventions. Although Kirkpatrick's model is one of these models, as Dessinger and Moseley (2006) assert, evaluation models for which both training and non-training performance improvement interventions are used have derived from Kirkpatrick's four levels of evaluation. However, the researchers have not reached a consensus about usage of Kirkpatrick's levels in non-training performance improvement interventions. Although this study provides a viable application of Kirkpatrick's model for the CSI Unit, there is a need to study the model's successful utilizations to evaluate different non-instructional interventions in different organizations. In that sense, apart from the four levels, the model's extended adaptations such as Kaufman's Mega Planning should also be carried out in different workplace settings to show societal impact of the implementations. As Schaffer and Schmidt (2006) suggest, the societal impact of the intervention should be determined after the impact on the organization and individual are identified. This procedure sustains that the societal impact plays an instrumental role in the design, development and implementation of the intervention. In general terms, the level-based evaluation models such as Kirkpatrick's models and Kauffman's framework, allow researchers to obtain information about the overall effectiveness and worth of a performance intervention (Bichelmeyer & Horvitz, 2006).

5.5. Recommendations for further Applications

Because of the site-specific and structural factors that exist within the context of the CSI Unit, these study findings might not highly be generalized to other organizations. Because every organization has a distinctive nature regarding management, financial, organizational, physical and social systems, individualized researches and private concentration should be required while making any performance-improvement initiative (Pershing, 2006a). However, not only the utilization of the HPT field's major models but also the adoption of a methodological approach to the performance improvement initiative provides a successful case for other organizations.

In general terms, the field of HPT has yielded useful approaches and solution strategies regarding human performance problems in organizations (Pershing et al., 2008a). With systematic and systemic views, HPT provides practitioners to look beyond training as a performance solution via addressing not only skills and knowledge but also focusing on workers' motivation and incentives, work processes, environment and other factors (Sala, 2003). Therefore, the organizations which would intend to use HPT principles and approaches should focus on their organizational processes in order to find out a reason. Indeed, as Brinkerhoff (2006) utters, in any performance improvement endeavor one does not need to begin with an explicit direction or explicit goals. Rather, requests for help or emerging some performance problems initiate the improvement process.

Following the decision step, the organization should get the official documentation including purpose, mission, vision, and other performance related documents ready for practitioners to be analyzed. These documents are important in that principles, ideas, and statements generating organizational culture define an organization (Pershing, 2006a). As for governmental organizations; especially, vision and mission statements which give the purpose and direction of the organization should be incorporated in the analysis processes. As Marr (2008) comments that organizational purpose gains meaning in government sector because of the fact that they provide a meaningful public service. The analysis of the official documentation is absolutely vital, as it is the case in this study, to other research processes such as design and development, and also evaluation. One important thing is that if the organization does not have any experience concerning performance improvement initiatives; that is to say, if there is no performance data or in readiness for these requirements, the required data and other vital documentation such as performance criteria or job tasks should be provided to the practitioners. Indeed, these processes might be also included in the initiative as an additional phase in order to determine organizational requirements. As Enos (2007) recommends that only key performance indicators and fundamental goals should be selected while doing a performance analysis process because it might require huge amounts of time and resource.

In doing so, the exact root causes of performance factors can be detected. As Brinkerhoff (2006) remarks that although any organization has lots of performance deficiencies; however, only some of them should be worth fixing and improving through HPT efforts owing to their different superlatives and impacts on the object of the organizations. Therefore, Gilbert's BEM offers a better alternative for organizations so as to conduct a cause analysis. As Crossman (2010) offers, Gilbert's BEM is more significant than ever before for organizations if today's global business competitive and economic conditions are taken into consideration. As aforementioned, even though only less than 20% of the performance problems can be sorted out (Watkins, 2007d), there are some difficulties with regard to the usage of Gilbert's BEM. If the organizational sides of these difficulties are taken into account, it can be asserted that although Gilbert's model is an outstanding diagnostic tool, it is really difficult to be understood by managers and some training and development professionals (Rothwell, 1995, 1996, 2005). Therefore, key stakeholders, managers and chiefs should be incorporated into the analysis processes in order to both obtain efficient analysis data and design and develop a proper intervention package taking part in post analysis phases.

Following the selection of an EPSS as a performance improvement intervention, organizations should also take notice of technological infrastructure. As McKay and Wager (2007) point out, the new software applications enable the development of the EPSS to be faster and more cost effective in consequence of the rise in its development. They continue to say that organizations are taking advantage of the advance in computer technology, thereby integration and implementation of the EPSS is also easier than ever before. For successful implementation and integration, organizations should focus on all performance components and ingredients. As Chang (2004) utters that the main objective of the EPSS for any organization should be improving both individual and organizational performance.

In that sense, design and development of the EPSS and also its components play a vital role for the successfulness of the initiative. Because an EPSS provides hybrid job aid solutions for the performers with software applications (Ruyle, 2005), the organization and design team should select appropriate EPSS types (intrinsic, extrinsic, or external) and also support components of the system. This decision is closely related with other support structures such as help contents and structures of the system. If the integrated approach is selected as it was in this study, the organization should support the usage of the system. Ma and Harmon (2006) suggest that knowledge management systems, EPSS and learning technologies should be connected as performance improvement interventions. One of the reasons is that such an integration can cover and solve many performance problems. Secondly, integrating these technologies enables organizations to be more effective. In general terms, any performance improvement system should be the most essential part of the organization (Rosenberg, 1990). Therefore, the focus should be on utilizing systematic propositions and practice for designing and developing the EPSS for organizations that integrate and contextualize interventions to support and enhance the performance (Villachica et al., 2006).

In doing so, all the people working at the organization should contribute to the performance improvement initiative. Especially, supervisors and managers should be included in the every effective analysis and evaluation processes because their willingness, desire and the capability to be effective in performance related endeavors are vital to be successful (Rossett, 2006). In other words, the hierarchical structure of the organization should be taken into consideration while implementing the EPSS. It is possible to assert that an EPSS as a performance improvement intervention would be both effective and successful in the hierarchical organizations such as governmental agencies in which the workers' status are clearly defined.

As for the evaluation of the implemented intervention, according to Gilbert (2007), success criteria for organizations should be measurable, observable and verified. Therefore, careful planning and proper implementation strategies should be executed with a great precision by the organization. This consideration is essential because it is often neglected in real evaluation efforts due to the fact that more money, time and support are required to be conducted (Van Tiem et al., 2004). Although the most used type of evaluation by HPT practitioners is the summative evaluation (Dessinger & Moseley, 2006), other evaluation types such as formative and confirmative evaluations should also be taken into consideration to obtain precise and reliable results of the implemented intervention.

More specifically, another important point concerning the evaluation of the EPSS with Kirkpatrick's model is that procedures and levels of the model should be adapted to the current situation of the organization and pace of the performance improvement initiative. Although Marker et al. (2006) claim that the general consensus on how the levels should be utilized for non-instructional interventions has not been so clear in the field, the evaluation strategy might be grounded on the site-specific and structural factors that exist within the context of the organization. Moreover, if the organization uses the Kirkpatrick's model, the extension of the levels might also be included in the evaluation plan. Practitioners and researchers are free to use any specific set of methods in data collection and data analysis procedures when they use a level-based evaluation model (Bichelmeyer & Horvitz, 2006). To illustrate, as carried out in this study, Kaufman's framework might be used to show societal benefits of the intervention. As Pershing (2006a) notes in a general manner that direct and indirect relations are needed between organizations when they perform in a larger environment. Similarly, Ferond (2006) states that besides the complexity and ambiguity in an organizational working environment, contemporary organizations have been inextricably intertwined with society. Therefore, the required documentation and preparations should be done. For example, supervisors and managers should be included in every effective analysis and evaluation process because their willingness, desire and the capability to be effective in performance related endeavors are vital to be successful (Rossett, 2006).

5.6. Conclusion

Recently, globalization and computer technology have a dramatic impact on the organizations. Thus, performance as a paradigm has become so important for the organizations in order to keep up the pace of change. To provide effective and efficient services and activities, management and executing of the performance concerning organizational and individual factors have been vital to the organizations. The HPT as a growing field offers organizations many options to compete for today's complex performance needs and demands. In today's highly competitive environment, an EPSS as a solution package for the performance issues provides organizations with required supports for their employees with variables which have an effect upon their performance. Therefore, the performance analysis, design, development and evaluation of the EPSS are crucial to the performance improvement initiative's success.

This dissertation study has intended to contribute to current literature relating to the HPT research and practice. More specifically, this study has initiated new researches and applications about the major phases of the HPT model such as analysis, design and implementation, and evaluation of the EPSS. In that sense, the implications and suggestions of this dissertation provide a base of specific usage of the major models designed and developed to conduct scientific inquiries.

As a conclusion, applications and research studies on an EPSS and major phases of the HPT model still need to be investigated. Therefore, the outcomes of this study might provide implications and insights to both researchers and key stakeholders in the organizations who want to use steps required to the performance improvement and the analysis, design and implementation, and evaluation of the EPSS in their applications and studies.

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APPENDIX A

PILOT VERSION OF THE INSTRUMENT (PHASE I)

EMNİYET GENEL MÜDÜRLÜĞÜ

KRİMİNAL POLİS LABORATUVARLARI DAİRESİ BAŞKANLIĞI

İŞ PERFORMANSINI ETKİLEYEN UNSURLARIN VE BEKLENTİLERİN TESPİT ANKETİ

AÇIKLAMA:

Bu anket Emniyet Genel Müdürlüğü Kriminal Polis Laboratuarları Daire Başkanlığı liderliğinde Orta Doğu Teknik Üniversitesi Eğitim Fakültesi Dekanlığı ve PDI-Erkom Bilgisayar Hizmetleri ve Dış Tic. A.Ş. ortaklığında TUBİTAK Kamu Kurumları Araştırma ve Geliştirme Projeleri Destekleme Programı çerçevesinde **"Kriminal Laboratuar Hizmetleri için Elektronik Performans Yönetimi Destekli Öğrenen Organizasyon Yapılandırılması"** projesi kapsamında hazırlanmıştır. Önerilen Proje ile EGM Kriminal Laboratuvar Hizmetleri bünyesinde çalışan ilgili meslek ve uzman personelin kendisini tanıma, özdeğerlendirme (bireysel nicel performansları hakkında farkındalık, duygularını yönetme, sezgilerini geliştirme, sosyal ilişkileri yönetebilme) düzeylerinin artırılması, Olay Yeri İnceleme ve Kimlik Tespit ve Kriminal Laboratuvar Hizmetlerinin daha kaliteli ve verimli olması için eğitim modelinin geliştirilmesi, sonuçların ölçülmesi, değerlendirilmesi ve sonucunda da personelin iş ve sosyal yaşamdaki başarısının artması, mesleki doyumunun gelişmesi, mesleği ile barışık olmasının sağlanması hedeflenmekte ve personelin imajının toplum nezdinde gelişmesi ve söz konusu teşkilatın bilimsel çalışmalarına olumlu katkı sağlaması beklenmektedir.

Bu amaç doğrultusunda, biraz sonra dolduracağınız anket sizin iş performansınızı etkileyen unsurları ve beklentilerinizi belirlemeyi amaçlamaktadır. **Elde edilen veriler akademik bilgi elde etmek amacıyla, yalnızca araştırmacılar tarafından kullanılacak ve gizli tutulacaktır.** Bilimsel bir çalışmaya yapacağınız katkılardan ve yanıtlarken göstereceğiniz duyarlılıktan dolayı şimdiden teşekkür ederiz.

Araştırma Grubu

Bu anket, TUBİTAK Kamu Kurumları Araştırma ve Geliştirme Projeleri Destekleme Programı çerçevesinde "Kriminal Laboratuar Hizmetleri için Elektronik Performans Yönetimi Destekli Öğrenen Organizasyon Yapılandırılması" projesi kapsamında Orta Doğu Teknik Üniversitesi tarafından hazırlanmıştır.

BÖLÜM 1: KİŞİSEL BİLGİLER

YÖNERGE: Lütfen aşağıdaki kişisel bilgilerinizi eksiksiz biçimde doldurunuz. Aşağıdaki bilgiler **akademik bilgi elde etmek amacıyla, yalnızca araştırmacılar tarafından kullanılacak ve gizli tutulacaktır.**

1. Cinsiyetiniz : ◯ Erkek ◯ Kadın

2. Rütbeniz :
   - ◯ 1. Sınıf Emniyet Müdürü
   - ◯ 2. Sınıf Emniyet Müdürü
   - ◯ 3. Sınıf Emniyet Müdürü
   - ◯ 4. Sınıf Emniyet Müdürü
   - ◯ Emniyet Amiri
   - ◯ Başkomiser
   - ◯ Komiser
   - ◯ Komiser Yardımcısı
   - ◯ Polis Memuru
   - ◯ Diğer .... (Lütfen yazınız)

3. Doğum Tarihiniz : 19 ___ ___ (Lütfen Yıl Olarak Yazınız.)

4. Hizmet Durumunuz : ◯ Kadrolu ◯ Sözleşmeli

5. Çalışma Saatleriniz :
   - ◯ Günlük 8 saat
   - ◯ 12 / 12
   - ◯ 12 / 24
   - ◯ 12 / 36
   - ◯ 24 / 48
   - ◯ Diğer ....(Lütfen Belirtiniz)

6. Görev Alanınız :
   - ◯ KPL Daire Başkanlığı
   - ◯ KPL Müdürlüğü
   - ◯ İl Olay Yeri İnc. Ve Kim.Tes.Şb.Md.

7. Mesleğe Giriş Yılınız : __ __ __ __ (Lütfen Yazınız.)

8. Branş Onay Yılınız : __ __ __ __ (Lütfen Yazınız.)

9. Hizmet Sınıfınız :
   - ◯ Emniyet Hizmetleri
   - ◯ Sağlık Hizmetleri
   - ◯ Teknik Hizmetler
   - ◯ GİH
   - ◯ Yardımcı Hizmetler

10. Eğitim Durumunuz :
    - ◯ İlkokul
    - ◯ Ortaokul
    - ◯ Lise
    - ◯ Ön Lisans
    - ◯ Lisans
    - ◯ Yüksek Lisans
    - ◯ Doktora

11. Hizmet içi eğitim alırken aşağıdakilerden hangilerini tercih edersiniz? (Birden Fazla Seçeneği İşaretleyebilirsiniz)
    - ◯ Sınıf içi (yüz yüze) Eğitim
    - ◯ İnternet Üzerinden Eğitim
    - ◯ Sınıf içi ve İnternet Üzerinden Eğitim (bir arada)
    - ◯ Video Tabanlı Eğitim
    - ◯ Basılı Materyaller Üzerinden Eğitim
    - ◯ Çalıştay

BÖLÜM 2. ÇEVRESEL ETKENLERİN PERFORMANS ÜZERİNDEKİ ETKİSİ

YÖNERGE: Aşağıda iş performansınızı etkileyen çevresel etkenlere yönelik ifadeler bulunmaktadır. Lütfen okuduğunuz ifadeleri mevcut çalışma ortamınızı ve kişisel değerlendirmelerinizi dikkate alarak yanıtlayınız. İfadeler hakkında aşağıdaki ölçeği göz önünde bulundurarak, 1 ile 7 arasındaki kutucuklardan sizi en iyi tanımlayan değeri işaretleyiniz. 1 KESİNLİKLE KATILMADIĞINIZI ve 7 KESİNLİKLE KATILDIĞINIZI ifade etmektedir. Eğer kendinizi 1 ile 7 arasında bir yerde görüyorsanız 2, 3, 4, 5 ya da 6 sayılarından birini işaretleyiniz.

		Kesinlikle Katılmıyorum ⟵⟶ Kesinlikle Katılıyorum
1.	İş arkadaşlarım işimi yaparken işime müdahale ederler.	1 2 3 4 5 6 7
2.	Olay Yeri İnceleme ve Kimlik Tespit ve/veya Laboratuar hizmetleri bünyesindeki personel işleriyle fazlasıyla ilgilenmektedir.	1 2 3 4 5 6 7
3.	Olay Yeri İnceleme ve Kimlik Tespit ve/veya Laboratuar hizmetlerine yönelik beklentiler oldukça yüksektir.	1 2 3 4 5 6 7
4.	Şu anki görevime alışmak oldukça zordu.	1 2 3 4 5 6 7
5.	İşimle ilgili birçok şeyi seviyorum.	1 2 3 4 5 6 7
6.	Olay Yeri İnceleme ve Kimlik Tespit ve/veya Laboratuar hizmetlerinde çalışanların çoğu yapmış oldukları işler için uygun olmayabilirler.	1 2 3 4 5 6 7
7.	Olay Yeri İnceleme ve Kimlik Tespit ve/veya Laboratuar hizmetlerinde çalışanların çoğu işlerinde iyi performans gösterirler.	1 2 3 4 5 6 7
8.	Olay Yeri İnceleme ve Kimlik Tespit ve/veya Laboratuar hizmetleri bünyesinde çalışmaya yönelik olumlu tutuma sahibim.	1 2 3 4 5 6 7
9.	İşimi önemli bir sorumluluk olarak görüyorum.	1 2 3 4 5 6 7
10.	İşimizi başarıyla tamamlasak bile bu kimse tarafından fark edilmiyor.	1 2 3 4 5 6 7
11.	Olay Yeri İnceleme ve Kimlik Tespit ve/veya Laboratuar hizmetlerinde iş tanımlarımız doğru tanımlanmıştır.	1 2 3 4 5 6 7
12.	Yardıma ihtiyacımız olduğunda amirlerimiz bize yardımcı olmak için zaman ayırırlar.	1 2 3 4 5 6 7
13.	Çalışma saatlerimiz yeterince esnektir.	1 2 3 4 5 6 7
14.	Ortaya çıkan problemlerin çözümü ile uğraşmak işimizin bir parçasıdır.	1 2 3 4 5 6 7
15.	İhtiyaç duyduğumda, işimi yapmak için gerekli olan kaynaklara rahatlıkla ulaşabilirim.	1 2 3 4 5 6 7
16.	Yaptığım iş Emniyet Teşkilatı için önemlidir.	1 2 3 4 5 6 7
17.	İşlerimi tamamlamak için gereken yeterli zamana sahibim.	1 2 3 4 5 6 7
18.	Yaptığım işin prosedürleri değiştiğinde, bununla ilgili eğitim verilmektedir.	1 2 3 4 5 6 7
19.	Görevli personeller olarak birbirimizi ve çalışma alışkanlıklarımızı biliriz.	1 2 3 4 5 6 7
20.	Tamamlamamız gereken işler için iyi bir şekilde organize olmuş durumdayız.	1 2 3 4 5 6 7
21.	Çoğu kişinin çalışırken rahat hissedeceği bir çalışma ortamına sahibiz.	1 2 3 4 5 6 7
22.	Olay Yeri İnceleme ve Kimlik Tespit ve/veya Laboratuar hizmetlerinde yüksek performans standartları mevcuttur.	1 2 3 4 5 6 7
23.	İş yerinde işi tamamlamamız için gereken araç ve teçhizata sahibiz.	1 2 3 4 5 6 7
24.	Yaptığımız işler ile ilgili amirlerimden sıklıkla geribildirim alırım.	1 2 3 4 5 6 7
25.	Rutin olarak işimizle ilgili karar verme sürecine katılırız.	1 2 3 4 5 6 7

3 / 4 SAYFA

BÖLÜM 3. KİŞİSEL ETKENLERİN PERFORMANS ÜZERİNDEKİ ETKİSİ

YÖNERGE: Aşağıda iş <u>performansınızı etkileyen çevresel etkenlere yönelik</u> ifadeler bulunmaktadır. Lütfen okuduğunuz ifadeleri <u>mevcut çalışma ortamınızı ve kişisel değerlendirmelerinizi</u> dikkate alarak yanıtlayınız. İfadeler hakkında aşağıdaki ölçeği göz önünde bulundurarak, 1 ile 7 arasındaki kutucuklardan sizi en iyi tanımlayan değeri işaretleyiniz. 1 KESİNLİKLE KATILMADIĞINIZI ve 7 KESİNLİKLE KATILDIĞINIZI ifade etmektedir. Eğer kendinizi 1 ile 7 arasında bir yerde görüyorsanız 2, 3, 4, 5 ya da 6 sayılarından birini işaretleyiniz.

		Kesinlikle Katılmıyorum ⟷ Kesinlikle Katılıyorum
1.	Çalışma ortamımda, düşük ya da sıfır performans ödüllendirilir.	1 2 3 4 5 6 7
2.	Yüksek performans karşılığında verilen ödüllerden memnuniyet duyarım.	1 2 3 4 5 6 7
3.	İşimin Olay Yeri İnceleme ve Kimlik Tespit ve/veya Laboratuar hizmetleri için önemli olduğunu düşünüyorum.	1 2 3 4 5 6 7
4.	Bireysel performansımı ya da takım performansını yeni şeyler yaparak geliştirmeye çalışırım.	1 2 3 4 5 6 7
5.	Öğrenme ihtiyaçlarımı karşılayabilecek uygun öğrenme etkinliklerine (kurslar, okuma, bireysel çalışma gibi) katılmayı isterim.	1 2 3 4 5 6 7
6.	İşim zorlu ve ilginç işler yapmak için fırsatlar sunar.	1 2 3 4 5 6 7
7.	Yapmakta zorunlu olmadığım işler için gönüllü olurum.	1 2 3 4 5 6 7
8.	Yaptığım iş bana anlamlı geliyor.	1 2 3 4 5 6 7
9.	İşimi yapmak için gerekli yeterliliğe sahibim.	1 2 3 4 5 6 7
10.	İş yerinde her bir görev için beklenen yeterlilikleri gösteren yazılı iş tanımlarına sahibiz.	1 2 3 4 5 6 7
11.	İş yerinde ortaya çıkan sorunların üstesinden başarılı bir şekilde gelebilirim.	1 2 3 4 5 6 7
12.	Ağır iş yükü olan çalışma arkadaşlarıma yardım ederim.	1 2 3 4 5 6 7
13.	İş yerimde bana verilen görevler için gerekli becerilere sahibim.	1 2 3 4 5 6 7
14.	Bilgi ve becerilerimizin arttırılması için gereken sistematik bir eğitim programına sahibiz.	1 2 3 4 5 6 7
15.	İşimde başarılı olmak için gerekli tecrübeye sahibim.	1 2 3 4 5 6 7
16.	Görev yerimde hem düşük hem de yüksek performansın ne gibi sonuçlar doğuracağını bilirim.	1 2 3 4 5 6 7
17.	İşimi başarılı bir şekilde yapabilmek için gereken teknik kavramları bilirim.	1 2 3 4 5 6 7
18.	İşimi başarmak için kullanabileceğim yardımcı araç ve gereçler çalışma ortamımda mevcuttur.	1 2 3 4 5 6 7
19.	İşimi yapmak için gerekli yeteneğe sahibim.	1 2 3 4 5 6 7

BÖLÜM 4: ORGANİZASYON PERFORMANSI

YÖNERGE: Aşağıda <u>içinde bulunduğunuz organizasyonun performansını ölçmeye yönelik</u> ifadeler bulunmaktadır. Lütfen okuduğunuz ifadeleri organizasyon ve iş ortamınızı dikkate alarak yanıtlayınız. İfadeler hakkında aşağıdaki ölçeği göz önünde bulundurarak, 1 ile 7 arasındaki kutucuklardan sizi en iyi tanımlayan değeri işaretleyiniz. 1 KESİNLİKLE KATILMADIĞINIZI ve 7 KESİNLİKLE KATILDIĞINIZI ifade etmektedir. Eğer kendinizi 1 ile 7 arasında bir yerde görüyorsanız 2, 3, 4, 5 ya da 6 sayılarından birini işaretleyiniz.

		Kesinlikle Katılmıyorum ⟷ Kesinlikle Katılıyorum
1.	Olay Yeri İnceleme ve Kimlik Tespit ve/veya Laboratuar hizmetlerinin daha verimli hale getirmenin yolları aranırken bilgi ve becerilerimizden iyi bir şekilde yararlanılır.	1 2 3 4 5 6 7
2.	Şu anki çalışma grubumdaki çalışma arkadaşlarım tarafından yapılan işlerin kalitesi oldukça yüksektir.	1 2 3 4 5 6 7
3.	Genel olarak, statü ya da rütbesine bakılmaksızın Olay Yeri İnceleme ve Kimlik Tespit ve/veya Laboratuar hizmetlerinde herkese saygı gösterilir.	1 2 3 4 5 6 7
4.	Olay Yeri İnceleme ve Kimlik Tespit ve/veya Laboratuar hizmetlerinde iş yaparken büyük hatalar yapılması olasılığı azdır.	1 2 3 4 5 6 7
5.	Olay Yeri İnceleme ve Kimlik Tespit ve/veya Laboratuar hizmetlerinde belirlenen hedeflere ulaşılma sıklığı oldukça yüksektir.	1 2 3 4 5 6 7

ANKET BİTMİŞTİR, KATILIMINIZ VE DESTEĞİNİZ İÇİN TEŞEKKÜR EDERİZ

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APPENDIX B

DELETED ITEMS AFTER PILOT STUDY

C1	İş arkadaşlarım işimi yaparken işime müdahale ederler.
C2	Olay Yeri İnceleme ve Kimlik Tespit ve/veya Laboratuar hizmetleri bünyesindeki personel işleriyle fazlasıyla ilgilenmektedir.
C4	Şu anki görevime alışmak oldukça zordu.
C5	İşimle ilgili birçok şeyi seviyorum.
C6	Olay Yeri İnceleme ve Kimlik Tespit ve/veya Laboratuar hizmetlerinde çalışanların çoğu yapmış oldukları işler için uygun olmayabilirler.
C7	Olay Yeri İnceleme ve Kimlik Tespit ve/veya Laboratuar hizmetlerinde çalışanların çoğu işlerinde iyi performans gösterirler.
C10	İşimizi başarıyla tamamlasak bile bu kimse tarafından fark edilmiyor.
C13	Çalışma saatlerimiz yeterince esnektir.
C20	Tamamlamamız gereken işler için iyi bir şekilde organize olmuş durumdayız.
C21	Çoğu kişinin çalışırken rahat hissedeceği bir çalışma ortamına sahibiz.
B1	Çalışma ortamımda, düşük ya da sıfır performans ödüllendirilir.
B2	Yüksek performans karşılığında verilen ödüllerden memnuniyet duyarım.
B4	Bireysel performansımı ya da takım performansını yeni şeyler yaparak geliştirmeye çalışırım.
B5	Öğrenme ihtiyaçlarımı karşılayabilecek uygun öğrenme etkinliklerine (kurslar, okuma, bireysel çalışma gibi) katılmayı isterim.
B6	İşim zorlu ve ilginç işler yapmak için fırsatlar sunar.
B7	Yapmakta zorunlu olmadığım işler için gönüllü olurum.
B14	Ağır iş yükü olan çalışma arkadaşlarıma yardım ederim.
B18	Bilgi ve becerilerimizin arttırılması için gereken sistematik bir eğitim programına sahibiz.

APPENDIX C

SCREENSHOTS FROM ONLINE VERSION OF THE FINAL INSTRUMENT (PHASE I)

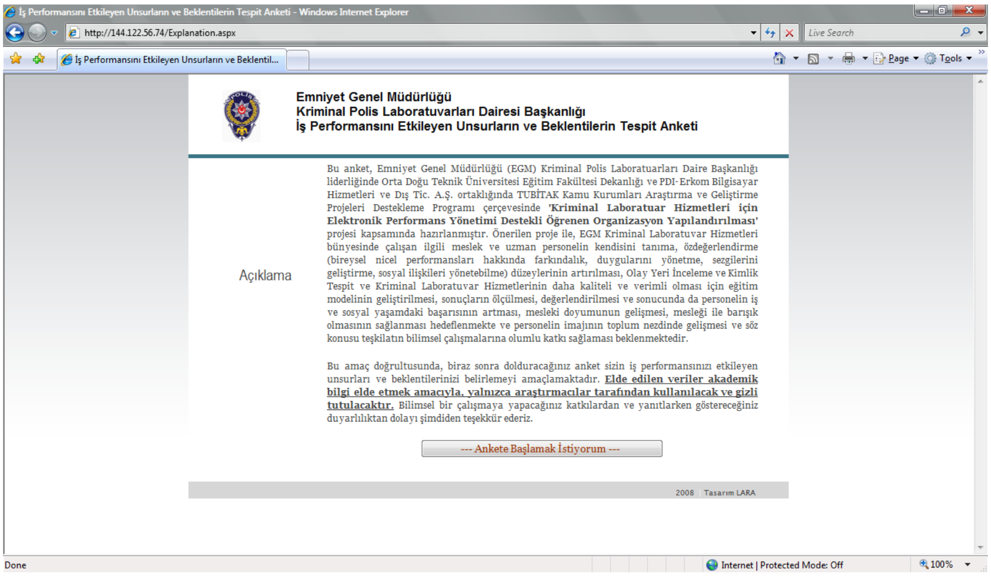


Figure C. 1 Introduction for survey

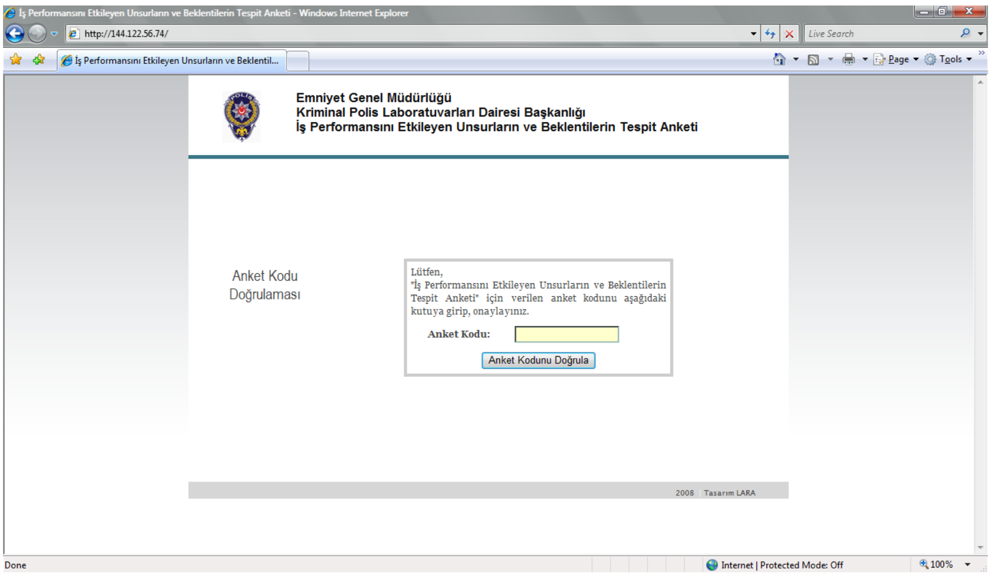


Figure C. 2 Confirmation Code for survey

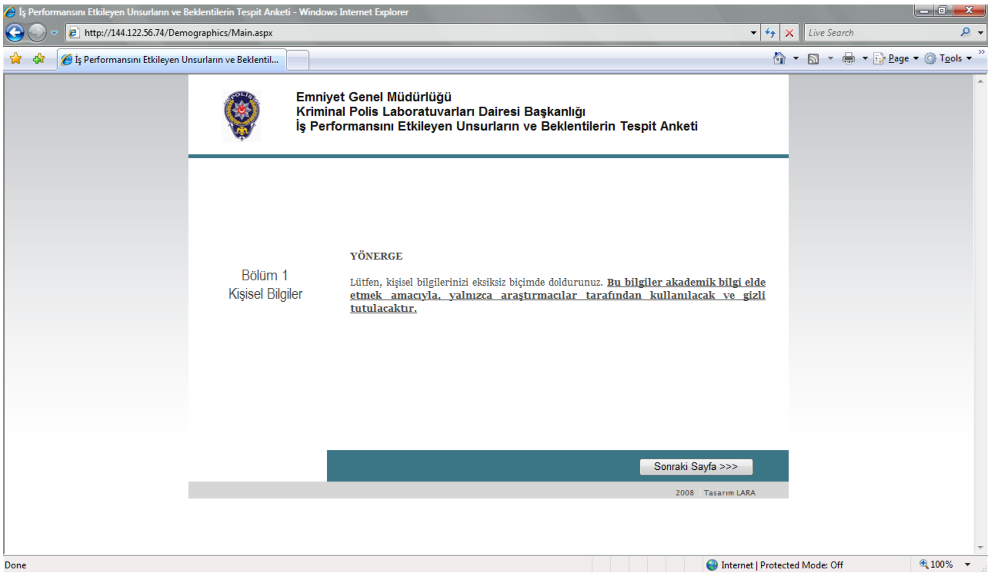


Figure C. 3 Instruction to survey

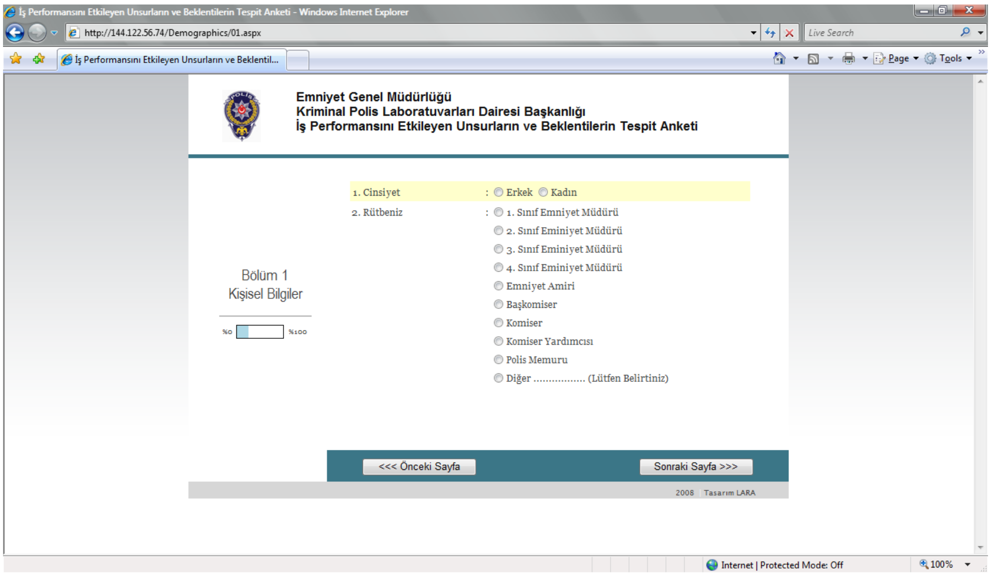


Figure C. 4 Demographics questions - I

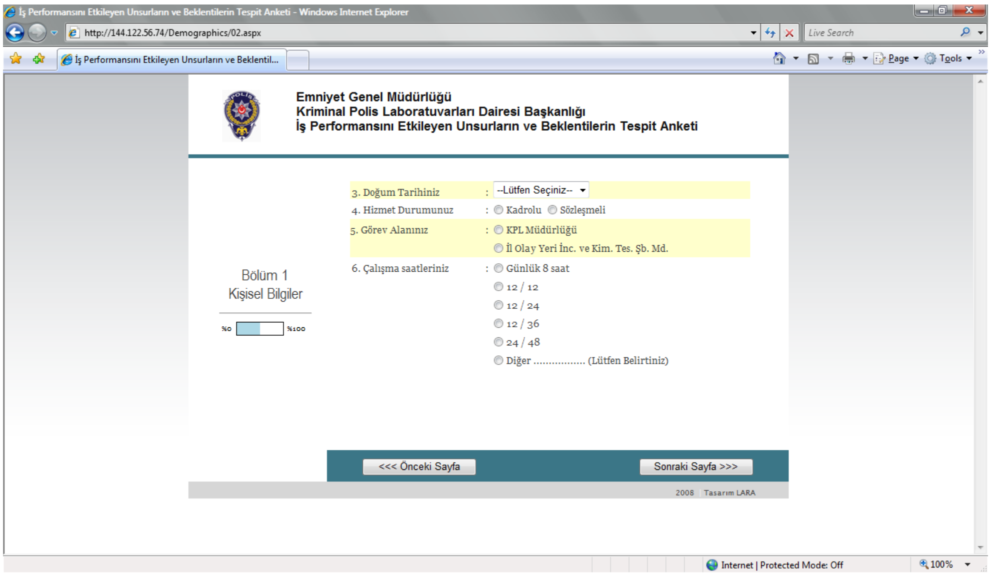


Figure C. 5 Demographics questions - II

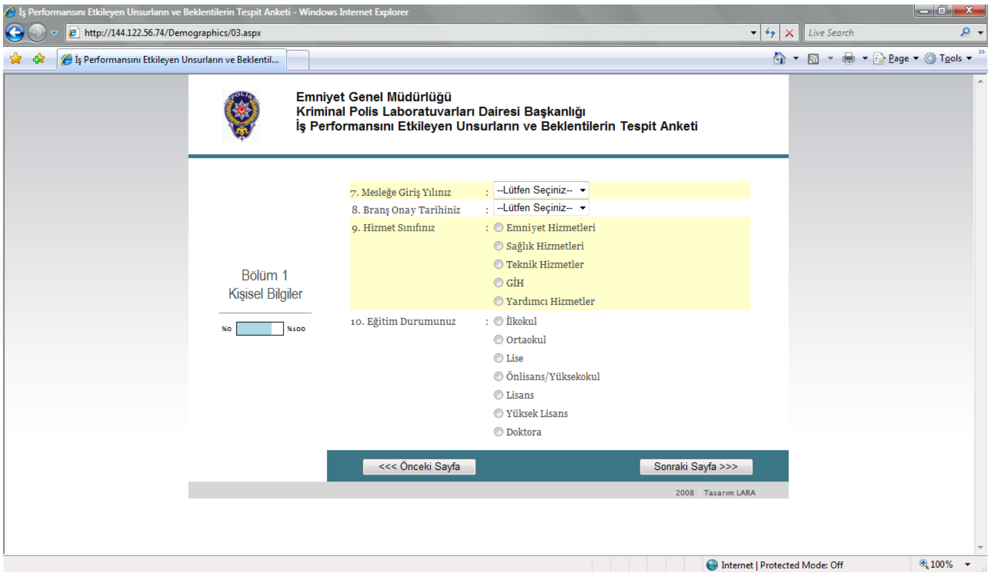


Figure C. 6 Demographics questions - III

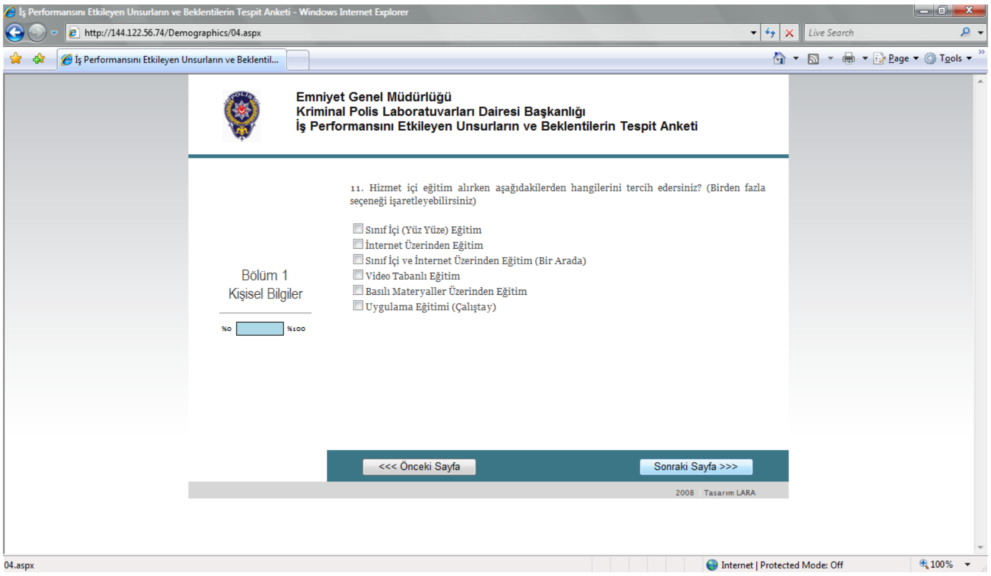


Figure C. 7 The preference of training methods section

Figure C. 8 Instruction of environmental and personal performance sections

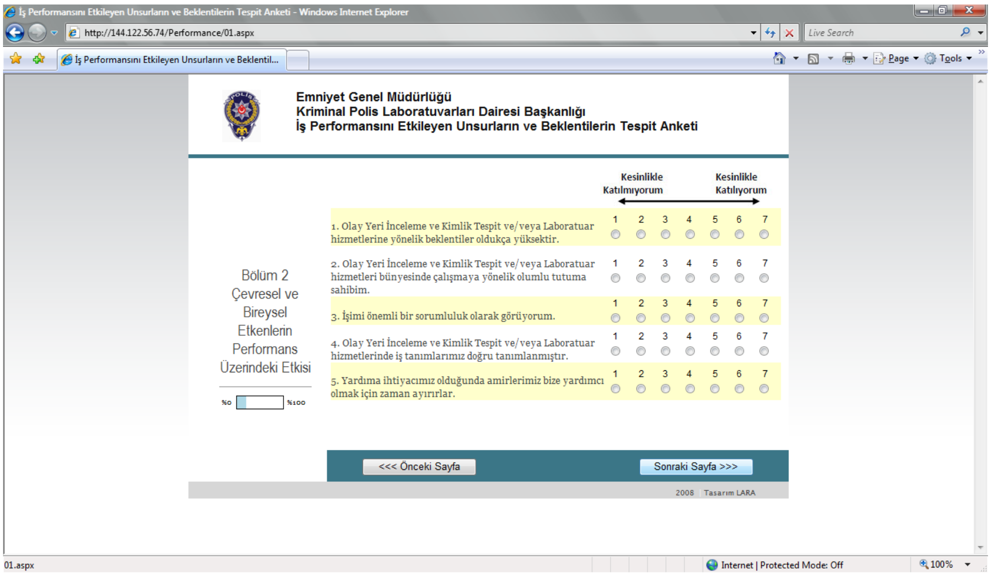


Figure C. 9 Likert scale questions - I

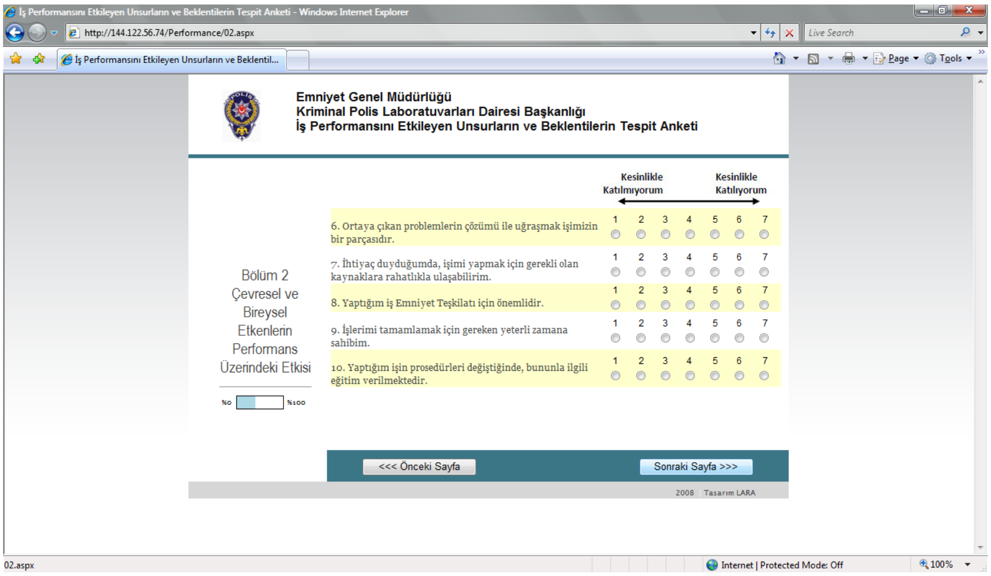


Figure C. 10 Likert scale questions - II

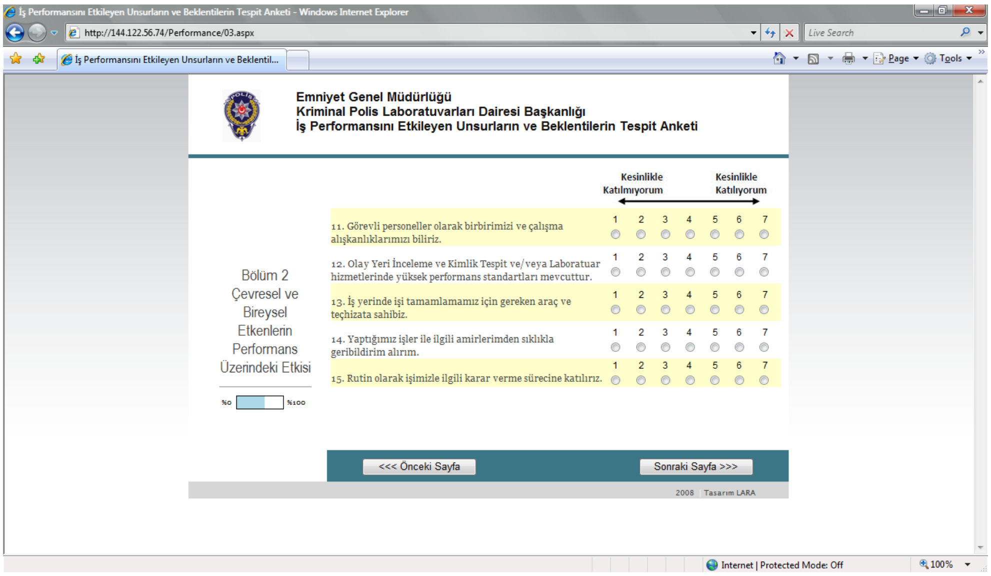


Figure C. 11 Likert scale questions - III

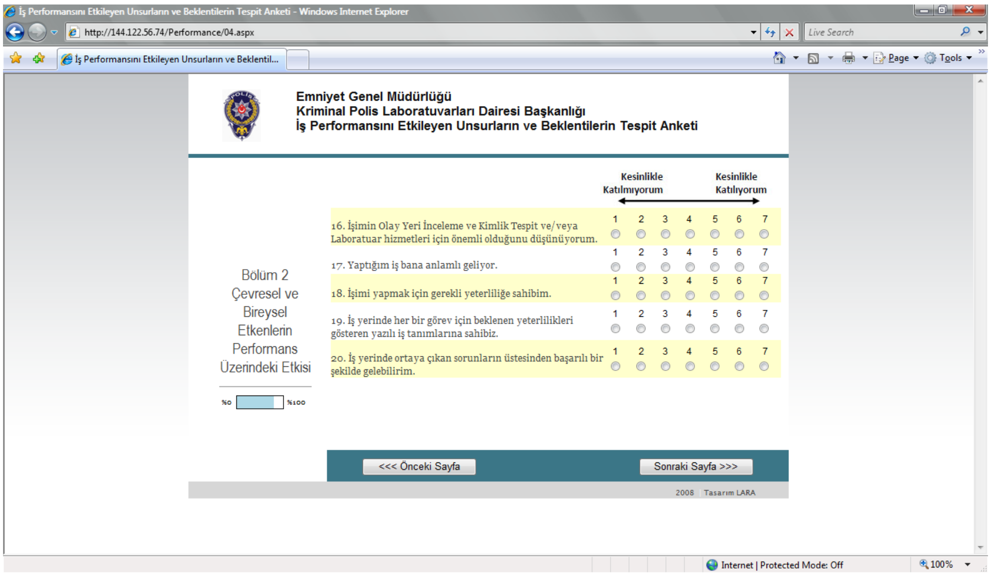


Figure C. 12 Likert scale questions - IV

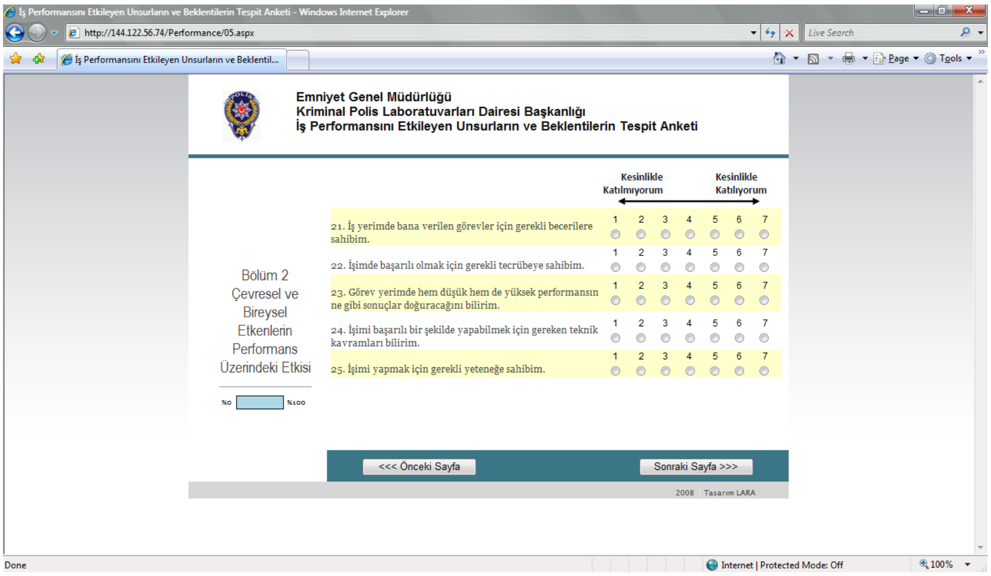


Figure C. 13 Likert scale questions - V

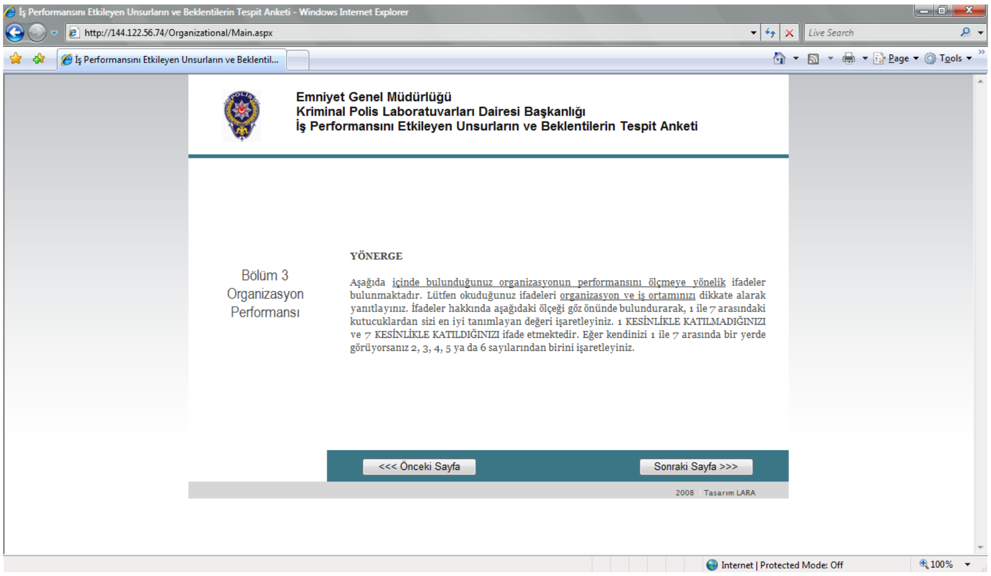


Figure C. 14 Instruction of organizational performance section

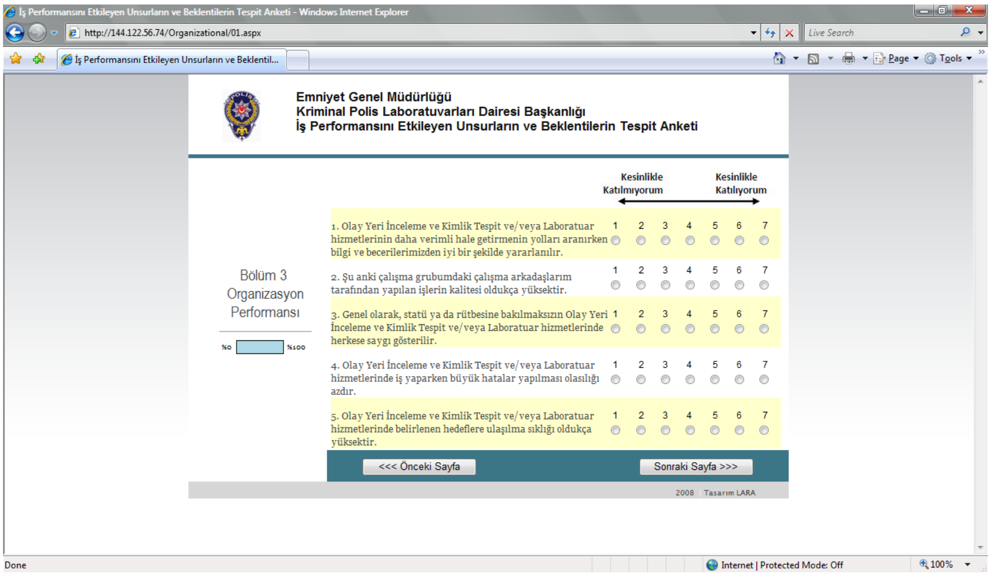


Figure C. 15 Likert scale questions - VI

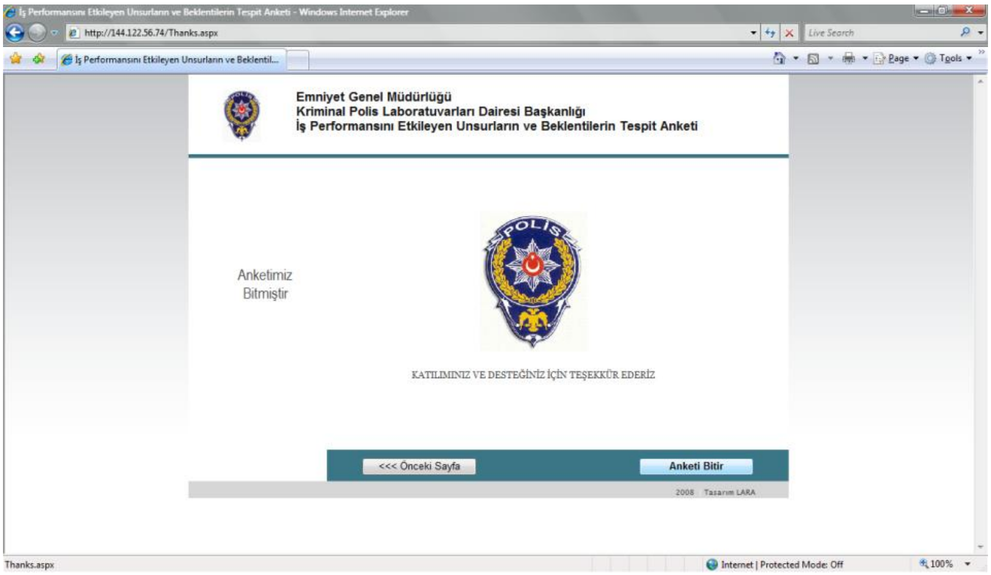


Figure C. 16 Likert scale questions - VII

APPENDIX D

FOCUS GROUP SCHEDULE (PHASE I)

ODAK GRUP GÖRÜŞME SORULARI

Görüşmeyi Yapan: ____________________ Tarih:__________

Öncelikle çalıştayımız içerisindeki odak grup görüşmeleri içerisinde yer alan bu bölümdeki etkinliğe katıldığınız için teşekkür ederiz. Gerçekleştirilecek olan odak grup görüşmesinde, "**Kriminal Laboratuvar Hizmetleri için Elektronik Performans Yönetimi Destekli Öğrenen Organizasyon Yapılandırılması"** projesi kapsamında sizlerinde katılım sağladığı ilk fazda yer alan *İş Performansını Etkileyen Unsurların ve Beklentilerin Tespiti* Anket Çalışmasının nitel veri toplama aşaması tamamlanacaktır. Proje ekibi olarak bu görüşmelerden Olay Yeri İnceleme ve Kimlik Tespit Şube Müdürlükleri'nde ve Kriminal Polis Laboratuarı Şube Müdürlükleri'nde görevli olan personellerin performanslarını etkileyen faktörleri irdelemek ve nedenleri üzerinde bilgi sahibi olmak hedefindeyiz. Dolayısıyla, bu konuda sizlerin bilgi ve tecrübelerinizden faydalanmak hem Elektronik Performans Destek Sistemi'nin oluşturulma sürecinde hem de daha genel olarak yürütülen projenin diğer aşamaları için biz proje ekibi için önemli bir kazanç olacaktır.

Kişisel bilgileriniz, cevaplarınız ve değerlendirmeleriniz kesinlikle gizli tutulacak, sadece proje ekibi içerisinde yer alan araştırmacılar tarafından gerçekleştirilen araştırmanın bir sonucu olarak kullanılacak ve araştırma sonunda rapor halinde proje raporlarında yer alacaktır.

Yapılacak olan görüşme hakkında sormak istediğiniz herhangi bir soru yok ise görüşmeye başlayabiliriz. Son olarak vereceğiniz bilgilerin ve yapacağınız değerlendirmelerin proje kapsamında kullanılmasına izin verir misiniz?

Bu görüşmeyi kaydetmemde bir sakınca var mı? Odak grup görüşmesi yaklaşık 40 dakika sürecektir.

GİRİŞ SORULARI

1. Mesleki kariyerleriniz hakkında kısaca bilgi verebilir misiniz? Kaç yılında, nerede göreve başladınız? Mevcut branşınıza kaç yılında atandınız?
2. Yaptığınız işin Emniyet Teşkilatı ve daha kapsamlı olarak adli süreç içerisindeki önemini nasıl tanımlarsınız?

GÖRÜŞME SORULARI

1. Çalışmakta olduğunuz branşınızla ilgili olarak en son aldığınız eğitimin türünü (yüz yüze, çalıştay, internet tabanlı vs.), kapsamını ve verimliliğini değerlendirebilir misiniz?
    - Çalışmakta olduğunuz branş ile ilgili olarak en son aldığınız eğitimin yaptığınız iş performansınıza olan etkisini değerlendirebilir misiniz?

SONDA:

- Hizmet içi eğitimlerin verilme sıklığı
- Hizmet içi eğitimlerin konuları
- Hizmet içi eğitimlerin verilme şekli (yüz yüze, çalıştay vs.)
- Hizmet içi eğitimlerin değerlendirilmesi

2. En son aldığınız eğitimin dışında, aldığınız diğer eğitimleri düşündüğünüzde eğitimlerin verimliliği ve yapısı hakkında bir değerlendirmede bulunabilir misiniz?
3. Olay Yeri İnceleme ve Kimlik Tespit Şube Müdürlüğü'nde belirli bir prosedürü veya adımı izleyerek yaptığınız bir iş düşünelim (örneğin, delil toplama ya da paketleme prosedürleri…). Süreç içerisindeki bir adımda veya prosedürün tamamında teknik bir bilgi ya da kavram eksikliği ile karşılaştığınızda eksikliği gidermek için ilk başvuracağınız kaynak nedir? Neden?

SONDA:

- Kitap
- İş tanımı
- İş ile ilgili yardım alabileceği kaynaklar (job aids)
- İş arkadaşı

4. Sizce branşınızda çalışan bir emniyet personelinin performansının en üst düzeyde olması için teknik bilgi ve yetenek açısından hangi yeterlilikleri göstermesi gereklidir?
   - Olay Yeri İnceleme ve Kimlik Tespit Şube Müdürlüğü'nde / Kriminal Polis Laboratuarı Şube Müdürlüğü'nde görevli bir personel olarak bu birimde çalışan birinin performansının en üst düzeyde olması için yeterlilikleri neler olmalıdır?
5. Branşınız ile ilgili bir iş yaparken bir sorun (problem) ile karşılaştığınızı düşünelim. Sorunu çözmek için nereden ve kimden yardım alırsınız?
   - İşinizi yaparken karşılaştığınız bir problem durumunda çözüm için neler yaparsınız?

SONDA:

- İş arkadaşları
- Yazılı iş tanımları
- Yazılı veya görsel materyaller-kaynaklar
- Amirleri

6. Çalışma ortamınızda yapmış olduğunuz işlerin planlanması, dağıtılması ve sonuçlandırılması aşamalarında amirleriniz ile gerçekleştirdiğiniz iletişim hakkında bilgi verebilir misiniz?
   - Çalışma ortamınızda amirleriniz ile yapılan işler ile ilgili olarak gerçekleştirdiğiniz toplantı ya da görüşmeleri değerlendirebilir misiniz?

SONDA:

- Amirlerden gelen geribildirimlerin sıklığı, niteliği ve sonuçları
- Amirlerin zaman ayırması
- Personellerin karar verme süreçlerine katılımi

7. KPL Daire Başkanı olsanız çalışan personellerinizin performanslarını en üst düzeye yükseltmek için çalışma ortamı, bireylerin yeterlilikleri ve işlerine verdikleri önem açısından neleri değiştirirdiniz? Ne tür yenilikler getirirdiniz?

   SONDA:

   - İş ortamı bazında
   - Bireysel yeterliliklerin geliştirilmesi bazında
   - Yapılan işlere gösterilen değer ve tutumlar bazında

8. Emniyet Teşkilatı içerisinde mevcut bulunduğunuz branşın dışındaki bir pozisyonda bulunmak ya da başka bir görevi yapmak ister misiniz? Neden?

APPENDIX E

THE EVALUATION SURVEY (PHASE III)

Emniyet Genel Müdürlüğü
Kriminal Polis Laboratuvarları Dairesi Başkanlığı
OYİ-KT Elektronik Performans Destek Sisteminin (EPDS) Değerlendirilmesi Anketi

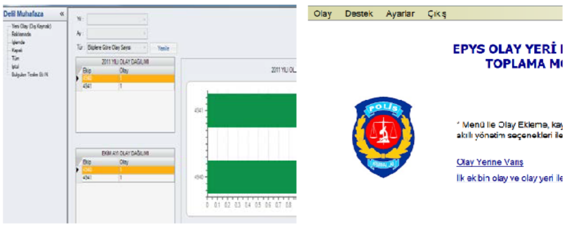
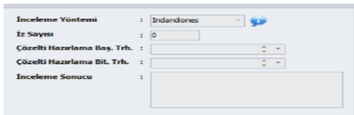
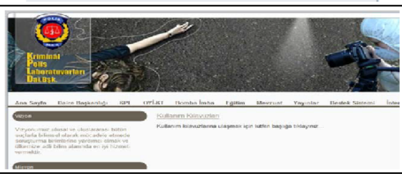
Değerli Katılımcı,

Biraz sonra dolduracağınız anket Olay Yeri İnceleme ve Kimlik Tespit Şube Müdürlüğü hizmetlerine yönelik olarak geliştirilen Elektronik Performans Destek Sisteminin (EPDS) değerlendirmesini amaçlamaktadır. Elde edilen sonuçlar, hem sistemin geliştirilmesinde hem de Olay Yeri İnceleme ve Kimlik Tespit Şube Müdürlüğü personelinin performanslarının olumlu yönde artırılmasında temel oluşturacaktır. Soruları ya da anket maddelerini yanıtlarken göstereceğiniz dikkat ve samimiyetin, sonuçların güvenilirliği açısından çok önemli olduğunu unutmayınız. **Elde edilecek bilgiler ve yanıtlar sadece bilimsel amaçlar için kullanılacak ve kesinlikle gizli tutulacaktır.**
Anket 5 bölümden oluşmaktadır ve yaklaşık 20 dakika sürecektir.

Çalışmaya yapacağınız değerli katkılar için şimdiden teşekkür ederiz.

Araştırma Grubu

Anket Maddelerinde Kullanılan Sistem Bileşenlerinin Açıklamaları ve Örnek Sayfaları

Bileşenler	Açıklama	Ekran Butonu	Örnek Sayfalar
İş Akış Arayüzü	İşiniz ile ilgili gerekli işlemlerin gerçekleştirildiği bölüm (Uzmanlık Bürolarının ve Olay Yeri İnceleme Ekiplerinin Sistem Arayüzleri)		
Destek Portalı	Arama seçeneği ve performans kriterleri ile ihtiyaç duyulan bilgi ve araçlara ulaşımı sağlayan bölüm		
Destek Paneli	İşinizi yapılırken ihtiyaç duyulan bilgi ve araçlara ulaşımı sağlayan bölüm		
Ana Portal	OYI-KT Şube Müdürlüğü ile ilgili dokümanları içeren bölüm		

BÖLÜM 1

Bu bölümde sizden kişisel bilgileriniz istenmektedir. Lütfen kişisel bilgilerinizi eksiksiz olarak doldurunuz. Elde edilecek sonuçlar **akademik bilgi elde etmek amacıyla, yalnızca araştırmacılar tarafından kullanılacak ve gizli tutulacaktır.**

1. Cinsiyetiniz	❒ Kadın	❒ Erkek
2. Yaşınız	……………………………… (Lütfen Yazınız)	
3. Olay Yeri İnceleme ve Kimlik Tespit Şube Müdürlüğünde göreve başlama yılınız nedir?	……………………………… (Lütfen Yazınız)	

BÖLÜM 2

Bu bölüm **Elektronik Performans Destek Sistemine (EPDS) yönelik tepkilerinizi** belirlemeyi amaçlayan ifadelerden oluşmaktadır. Her bir ifade için size uygun gelen tek bir seçeneği işaretleyiniz.

	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
EPDS'nin kişisel gelişimim için katkı sağladığını düşünüyorum.	①	②	③	④	⑤
EPDS kişisel gereksinimlerime cevap verip işimi daha iyi yapmamı sağlar.	①	②	③	④	⑤
EPDS sayesinde yaptığım iş ile ilgili yeni bilgiler öğreniyorum.	①	②	③	④	⑤
EPDS işimi daha iyi yapabilmem için bana yardımcıdır.	①	②	③	④	⑤
EPDS sayesinde yaptığım iş ile ilgili olarak çalışma arkadaşlarımla daha fazla iletişim kurabiliyorum.	①	②	③	④	⑤
EPDS içerisinde yer alan destek bilgileri yaptığım iş ile uygunluk göstermektedir.	①	②	③	④	⑤
Destek bilgilerinin farklı şekillerde sunulmasının (eğitim dokümanları, bilgi kartı, ipucu vb.) yararlı olduğunu düşünüyorum.	①	②	③	④	⑤
Kullanım kılavuzlarının sistemin iyi bir şekilde kullanılması açısından yararlı olduğunu düşünüyorum.	①	②	③	④	⑤
EPDS sisteminin genelinden memnun olduğumu söyleyebilirim.	①	②	③	④	⑤
EPDS sisteminin geliştirilmesi için önerileriniz nelerdir? Lütfen belirtiniz.					

BÖLÜM 3

Bu bölüm Elektronik Performans Destek Sistemi (EPDS) içerisinde yer alan **bileşenlerle işinizde ne derece verim sağladığınızı** belirlemeyi amaçlamaktadır. Her bir destek bileşeni için size uygun tek bir seçeneği işaretleyiniz.

Destek Bileşenleri *(Anketin ilk sayfasında bileşenler hakkında ihtiyaç duyduğunuz bilgilere ulaşabilirsiniz.)*	Hiç	Biraz	Kısmen	Oldukça	Çok
İş Akış Arayüzü (iş ile ilgili gerekli işlemlerin gerçekleştirildiği bölüm)	①	②	③	④	⑤
Destek Portalı (arama seçeneği ve performans kriterleri ile ihtiyaç duyulan bilgi ve araçlara ulaşımı sağlayan bölüm)	①	②	③	④	⑤
Destek Paneli (iş yapılırken ihtiyaç duyulan bilgi ve araçlara ulaşımı sağlayan bölüm)	①	②	③	④	⑤
Ana Portal (OYI-KT Şube Müdürlüğü ile ilgili dokümanları içeren bölüm)	①	②	③	④	⑤

Sayfa **2/ 3**

BÖLÜM 4

Bu bölüm **Elektronik Performans Destek Sisteminin (EPDS) iş performansınıza yönelik katkılarını** belirlemeye yönelik ifadelerden oluşmaktadır. Her bir ifade için size uygun gelen tek bir seçeneği işaretleyiniz.

EPDS kullanarak…	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
işimi daha hızlı bir şekilde tamamlayabiliyorum.	①	②	③	④	⑤
işimi daha doğru yapabiliyorum.	①	②	③	④	⑤
işimle ilgili amirlerime danışmam gereken konular azaldı.	①	②	③	④	⑤
işimle ilgili ihtiyaç duyduğum bilgilere hızlı bir şekilde ulaşabiliyorum.	①	②	③	④	⑤
işimi yapmak için gerekli yeterlik düzeyim arttı.	①	②	③	④	⑤
işimi yapmak için gerekli teknik bilgi seviyem arttı.	①	②	③	④	⑤
işimi yapmak için gerekli beceri seviyem arttı.	①	②	③	④	⑤
iş arkadaşlarım ile iletişimim arttı.	①	②	③	④	⑤
işimle ilgili karar alma sürecine katılabiliyorum.	①	②	③	④	⑤
iş performansım ile ilgili sonuçlar hakkında yorumlar yapabiliyorum (İş Akış Arayüzü'nün açılış sayfasındaki bilgi panelinde yer alan bilgi ve grafikler yardımıyla).	①	②	③	④	⑤
işimin bir parçası olan form ve ekspertiz raporlarını hızlı bir şekilde üretebiliyorum.	①	②	③	④	⑤

BÖLÜM 5

Bu bölüm Elektronik Performans Destek Sisteminin (EPDS) **OYİ-KT Şube Müdürlüğü ve toplumsal açıdan kazanımlarını** içeren ifadelerden oluşmaktadır. Her bir ifade için size uygun gelen tek bir seçeneği işaretleyiniz.

EPDS kullanarak OYİ-KT Şube Müdürlüğü'nün…	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
verimliliğinin (işleri doğru şekilde ve zamanda yapma) artacağını düşünüyorum.	①	②	③	④	⑤
hizmet içi eğitim için harcanan maliyetlerinin (ulaşım, personel ve materyal vb.) düşeceğini düşünüyorum.	①	②	③	④	⑤
sağladığı hizmetlerin ve sonuçlarının kalitesinin artacağını düşünüyorum.	①	②	③	④	⑤
dokümantasyon işlerinin azalacağını düşünüyorum.	①	②	③	④	⑤
iş akışlarının tüm bürolarda standart şekilde uygulanacağını düşünüyorum.	①	②	③	④	⑤
adli sürecin zaman yönünden kısaltılmasına katkı yapacağını düşünüyorum.	①	②	③	④	⑤
yargı karar süreçlerinin kısaltılmasına destek olacağını düşünüyorum.	①	②	③	④	⑤
toplum huzuruna katkı sağlayacağını düşünüyorum.	①	②	③	④	⑤
kurum kimliğinin vatandaş gözünde iyileştirilmesine katkı sağlayacağını düşünüyorum.	①	②	③	④	⑤

ANKET BİTMİŞTİR, KATILIMINIZ VE DESTEĞİNİZ İÇİN TEŞEKKÜR EDERİZ…

Sayfa **3/ 3**

APPENDIX F

CHECKLIST FOR EXPERT REVIEW

ELECTRONIC PERFORMANCE SUPPORT SYSTEM DESIGN CHECKLIST

You will see a checklist enclosed on the EPSS and its components. This checklist has been prepared to get your ideas on task support, usability, and aesthetics of the EPSS. Please indicate your comments while assessing existing interfaces from a users' point of view. Thank you for assisting in this research.

Focus	Questions	Yes	No	Comments
TASK SUPPORT				
Audience	The EPSS and how it works come close to users' own perceptions.			
	The design is flexibility to accommodate both inexperienced and experienced personnel.			
	This EPSS is a good fit for the personnel's level of expertise and the job at hand.			
User Goals	This system enhances productivity.			
	The system contains information that personnel regularly uses.			
	The EPSS supports the work of personnel.			
Functionality	Personnel have any idea from the opening screens what the system can do.			
	The general output works.			
	Users can access in a few easy steps.			
	Users can customize the display to meet their needs.			
	The EPSS does most of the work instead of the personnel.			
Control	The interface is flexible.			
	Personnel get to choose when to do what or does the interface exert control over the user.			
	The EPSS helps users crystallize their thoughts.			
	Personnel's requests or needs are anticipated.			
USABILITY				
Learnability	The system is intuitive.			

Table *Continued*

Learnability	There is consistency in the layout, graphics, vocabulary, and commands. The functions that personnel need are displayed prominently. The interface delivers immediate rewards. The interface avoids frustrating personnel.
Navigation	The navigational system is complex. Personnel can get through the system quickly. The navigational layout is obvious. There are visual cues showing what is operational. Personnel's steps are retraceable. There are too many repetitive steps to move through to get a task done. Personnel can customize to eliminate steps.
Assistance	The EPSS helps personnel solve performance problems. The system is proactive, warning users against potential problems. Help systems are continuously available in the EPSS. The system can answer questions. The system can help users navigate if their mental mapping breaks down.
AESTHETICS	
Appearance	The system is a good match with the hardware. Personnel are not distracted by the use of color and layout. The screen is uncluttered. Multiple windows can be opened at once and does this cause any overload to the personnel. The type size and font are effectively used. The pages are readable. Color is evenly used to prevent clutter and confusion.
Interaction	As personnel improve at using the system, more advanced options available. Personnel are directly engaged when they interact with the tool. The system is slow and dragging.

Table *Continued*

Interaction	The processing speed matches that of the users. There are too many keystrokes/stylus strokes to complete a task. The processing time is worth the wait.
Enjoyment	The system maintains a level of interest. Personnel get what they want done now. The system encourages personnel to jump ahead rather than click on the same path. The response time is reasonable. The system is worth having.

APPENDIX G

INTERVIEW SCHEDULE (PHASE III)

GÖRÜŞME SORULARI

Görüşme Yapılan İl: ____________________ Tarih: _____________

Öncelikle "**Kriminal Laboratuvar Hizmetleri için Elektronik Performans Yönetimi Destekli Öğrenen Organizasyon Yapılandırılması"** projesi kapsamında gerçekleştireceğimiz bu görüşmeye katkı sağladığınız için teşekkür ederiz. Bu görüşme Olay Yeri İnceleme ve Kimlik Tespit Şube Müdürlükleri için geliştirilen Elektronik Performans Destek Sistemi'nin (EPDS) değerlendirilmesi amacıyla gerçekleştirilecektir. Dolayısıyla, bu görüşme ile aktaracağınız tecrübeleriniz ve düşünceleriniz geliştirilen sistemin gelecekte daha verimli bir şekilde kullanılması için aydınlatıcı nitelikte olacaktır.

Kişisel bilgileriniz, cevaplarınız ve değerlendirmeleriniz kesinlikle gizli tutulacak, sadece proje ekibi içerisinde yer alan araştırmacılar tarafından gerçekleştirilen araştırmanın bir verisi olarak kullanılacaktır.

Yapılacak olan görüşme hakkında sormak istediğiniz herhangi bir soru yok ise görüşmeye başlayabiliriz. Son olarak vereceğiniz bilgilerin ve yapacağınız değerlendirmelerin proje kapsamında kullanılmasına izin verir misiniz?

Bu görüşmeyi kaydetmemde bir sakınca var mı? Odak grup görüşmesi yaklaşık 30 dakika sürecektir.

GİRİŞ SORULARI

1. Mesleki kariyerleriniz hakkında kısaca bilgi verebilir misiniz? Kaç yılında, nerede göreve başladınız? Mevcut branşınıza kaç yılında atandınız?

GÖRÜŞME SORULARI

2. Elektronik Performans Destek Sisteminin beğendiğiniz yönleri nelerdir? Örnekler verebilir misiniz?
   - Elektronik Performans Destek Sisteminin beğenmediğiniz yönleri nelerdir? Örnekler verebilir misiniz?
3. Elektronik Performans Destek Sistemi işinizi yapabilmek için ne derecede önemlidir? Bir değerlendirmede bulunabilir misiniz?
4. Elektronik Performans Destek Sisteminin kullanılmasının iş performansınıza olan etkisi hakkındaki düşünceleriniz nelerdir? Kişisel olarak size sağladığı faydalar nelerdir?

   SONDA:
   - Bilgi, Beceri, Yeterlik
   - Problem Çözme, Sonuçları değerlendirme
5. Elektronik Performans Destek Sisteminin iş ortamınıza olan etkisi hakkında bilgi verebilir misiniz?

   SONDA:

- İletişim, Kaynaklara Ulaşım, İş Akışı

6. Geliştirilen sistemin işiniz ile ilgili sağladığı çözümlere örnekler verebilir misiniz?
7. Sizce Elektronik Performans Destek Sistemi'nin OYİ-KT Şube Müdürlüğü için önemi nedir?
   - Geliştirilen Elektronik Performans Destek Sistemi OYİ-KT Şube Müdürlüğü teşkilatını nasıl etkileyecektir?
8. Elektronik Performans Destek Sisteminin adli sürece yapacağı katkı hakkındaki değerlendirmeleriniz nelerdir?
9. Elektronik Performans Destek Sisteminin topluma yapacağı katkı hakkındaki değerlendirmeleriniz nelerdir?
10. Elektronik Performans Destek Sisteminin yazılımını siz geliştirseydiniz mevcut sistemden farklı neler yapardınız?

APPENDIX H

HISTOGRAM, NORMAL P-P PLOT, and SCATTERPLOT

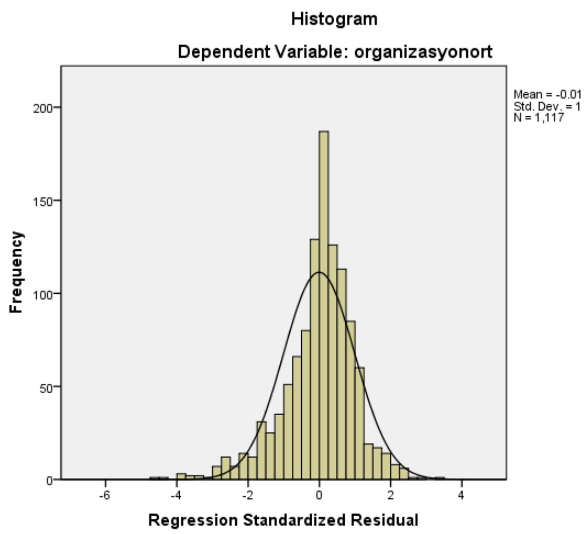


Figure H. 1 Histogram

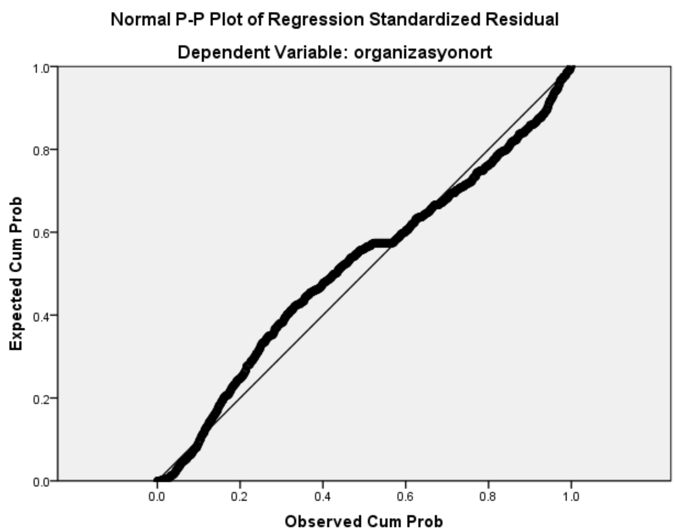


Figure H. 2 Normal P-P Plot

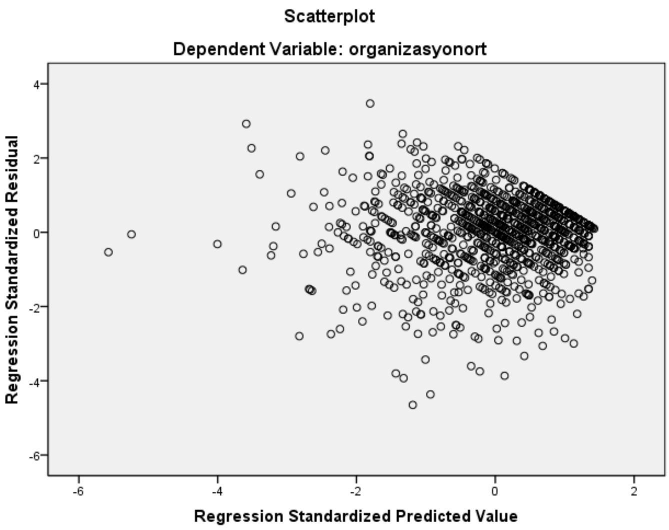


Figure H. 3 Scatterplot

APPENDIX I

QUOTATIONS FROM THE PARTICIPANTS' INTERVIEWS

[1] …Genel olarak amirlerimizle iyi bir diyaloğa sahibiz. Genel veya işimizle ilgili her şeyi paylaşabiliyoruz. Şu ana kadar herhangi bir zorlukla karşılaşmadık…

[2] …Resmi kalite yönetim sistemimizin bir gereği olarak, her ay iş görevlerimizin pozitif ve negatif anlamlarını konuşmak için toplantılar düzenliyoruz. Sadece bu toplantılar değil, iş görevleri ile ilgili olarak problemi olan ya da önerileri olan polis memurları gerekli olduğunda gelebilirler ve bizimle bunları paylaşabilirler…

[3] Bizim laboratuvarımızda etkileşimli bir ilişki vardır. Geribildirimler koşulsuz olarak sağlanır. Amirlerimiz de bizim gibi uzmandır. Tüm süreçlerin içinde yer alırlar.

[4] …Geribildirim alırız. Örneğin bir olay yeri incelemesi sonunda amirlerimiz bize geribildirim verirler. İnceleme metotlarımız veya eksik kalan şeyler ile ilgili yorumlar yaparlar. Genel yorumları şu şekilde olur: incelemeni şu şekilde yapmalısın veya incelemenin şu bölümü güzel. Demek istediğim çok fazla formalite yoktur…

[5] …İşimle ilgili bir problemle karşılaştığımda amirim bir kütüphane gibi çözüm bulmak için hazırdır… Çözümü olmayan bir problem var ise iş görevlerinin yönetiminden sorumlu amirlerimizle bir araya geliriz.

[6] …Her sabah konuşuruz. Ayrıca, amirlerimizi olay yeri incelemeleri ile ilgili tüm süreçler hakkında bilgilendiririz. Bunun yanında personelimin problemlerin çözümünde sorunları olduğunu fark edersem amirimle buluşup çözüm yolu hakkında görüşürüm.

[7] …Her ne kadar uzmanlar arasında bilgi paylaşımı önemli ise de birbirimizden haberdar değiliz. Ne yaptıklarını bilmiyoruz [farklı illerdeki olay yeri inceleme büro amirliği memurları] ve onlar da bizim ne yaptığımız hakkında bir fikirleri yok…

[8] …Öncelikle iletişim eksikliği var. Kriminal Polis Laboratuvarı ile bile aramızda herhangi bir iletişim kanalına sahip değiliz…

[9] …Neticede, tüm personelin birbiri ile iletişim kuracağı bir sistem geliştirme zorunluluğu var.

[10] …İş görevim ile ilgili olarak bir problem ile karşılaştığımda ilk olarak iş arkadaşlarımdan profesyonel yardım alırım. Eğer problemi çözemezsek, amirlerimizden yardım alırız. Eğer problem çok genelse, çözüm resmi toplantılarda bulunur.

[11] …Eğer problem işte kullanılan bir araçtan kaynaklanırsa problemin kaynağını bulmak için basılı belgelerdeki prosedürleri izleriz. Eğer herhangi bir kanıt bulamazsak

en kıdemli memurlara ve amirlere danışırız. Ancak şu ana kadar çözülemeyen çok büyük problemlerle karşılaşmadık…

[12] …Emniyet Teşkilatı hiyerarşik bir organizasyon olduğundan bence polis memurlarının iş ile ilgili sonuçlara katılımları çok da önemli değildir…

[13] Bizim kurumumuzda çok fazla formalitenin olduğuna inanmıyorum. Herhangi bir çekince olmadan düşüncelerimizi söyleyebiliyoruz.

[14] İş görevlerimizi nasıl yapacağımıza dair yönetmelik ve kurallara sahibiz. Fakat, gerekli bilgileri bulmak gerçekten çok zor. Gerekli olduklarında değil, bu materyallerin tüm memurların ellerinin altında olması lazım…

[15] …5-10 yıl önce alınan eğitimlerin sonuçlarını hatırlarken gerçekten büyük zorluk yaşıyoruz. Aslında bu normal bir durum. Eğer uygulama yapmazsanız unutabilirsiniz. Bu yüzden ihtiyaç duyulduğunda bakıp bulabileceğiniz referanslara ihtiyacınız vardır. Bunlara elektronik olarak ulaşılabilir, bu yüzden farklı yerlere tayin edilsek bile bunları kullanabiliriz…

[16] …Bizim lojistik problemlerimiz var. Becerilerimizi gösterebileceğimiz yüksek teknolojik araçlara ihtiyacımız var… Diğer bir deyişle teknolojik araçlara yönelik bir şeyler yapmamız lazım çünkü biraz yetersiziz.

[17] …Bizim araçlar ve materyaller açısından cihaz gereksinimlerimiz gün ve gün artmaktadır. Demek istediğim iyi olanaklara sahip olmalıyız. Ne kadar seçeneğe sahip olursak o kadar iyi kriminal servisler ve işlemler üretebiliriz…

[18] Bir ildeki personel sayısı ve o ilde işlenen suç oranları ile ilgili olarak büro amirliklerindeki kriminal servislerin iş akışları farklı şekilde gerçekleştirilmektedir. Her ne kadar yönetmeliklerimizde yazıldığı gibi aynı işlemleri izlesek de tüm illerde bir standart sağlanmalıdır.

[19] …Farklı bir ile tayin edildiğinizde en büyük problem onların izledikleri prosedürleri öğrenmek oluyor. Eski prosedürlere alışkın olduğundan, mesela zorunlu olarak inceleme sonunda yazmış olduğum uzmanlık raporları format ve içerik açısından farklı üretiliyor…Aslında aynı işi yapıyoruz.

[20] Bizim sahip olduğumuz diğer bir problem ise dokümantasyon. Yazmadığımız ve kaydetmediğimiz için birçok şeyi kaybediyoruz. Bence bu çözülmesi gereken en büyük problem. Özellikle ürettiğimiz basılı ve görsel materyalleri belgelendirmiyoruz.

[21] …Biz gelişmiş bir literatüre sahip değiliz. Örneğin, biz KATEM için bir kitap yazdık. Kitap içinde adım adım iş görevlerini gösteren prosedürlerin internet üzerinden bulmak istediğimiz her şeyi aratıp bulabilmemiz için sunulmasının bizler için gerçekten çok yararlı olacağını tahmin ediyorum…

[22] …Öncelikle kişi işinde ne yaptığının farkında olacak. Yani burada [Olay yeri inceleme büro amirliği] ne yapıldığına dair geniş bilgisinin olması gerekli. Tüm süreçlerin farkında olmalı. Örneğin, biyometrik veri işlemleri büro amirliğinde çalışıyorsa temel bilgiye sahip olmalı. Özel olarak olay yerinden toplanan bir silahın büroya getirildikten sonra el yapımı veya orijinal olduğunu bilmesi lazım…

[23] …Olay yeri inceleme büro amirliğinde çalışmak isteyen bir polis memuru elektronik ve bilgisayar hakkında bilgi sahibi olması gereklidir. Ayrıca, inceleme metotlarını mesela kimyasal ve tozlama metotlarını bilmelidir. Bunun dışında transfer, toplama ve paketleme özel eğitim gerektiren diğer metotlardır. Eğer bunları bilmiyorsa ya olay yeri inceleme büro amirliğinde polis memuru olmayı hak etmiyordur ya da yeterli eğitimleri alacaktır…

[24] …Polis memuru dikkatli olmak zorundadır ve olay yerini ve adli faaliyetleri faklı perspektiften görmelidir. Detayları görmelidir. Bunu yapmak için sorgulama yetisine sahip olmalıdır. Ayrıca bu faaliyetlerin neden yapıldığını bilebilmek için gerekli beceriye sahip olmalıdır.

[25] …Olay yeri inceleme bürosunda çalışan bir memur her şey hakkında meraklı olmalıdır. Olay yeri inceleme kitlerini kullanmada çok büyük beceriler göstermelidir. Bizim inceleme araçlarımız 15-20 farklı araçlar ile donatılmıştır. Memur bu donanımı kullanabilecek gerekli becerilere sahip olmalıdır.

[26] … Bence bir memur bir olay yeri incelemesini gerçekleştirirken fiziksel becerileri göstermelidir. Bu olmazsa olmazdır. İş görevlerini yapmaya karşı eğilim göstermelidir.

[27] …Olay yeri inceleme memurları sahip oldukları becerileri ustalıkla kullanmalıdır… Mesela, hem olay yeri inceleme hem de diğer büro amirliklerinde birçok araç ve teknik donanım kullanılmaktadır. Biz bunların [hizmet içi] eğitimlerin sonucu olarak doğru bir şekilde kullanılması gerektiğini düşünüyoruz.

[28] …Eğitimin gerekliliği açık çünkü bilgi bir sistem olarak değişmekte ve sürekli kendini yeniden oluşturmakta. Şube müdürlüğü veya büro amirliği veya bireyler olarak biz her zaman eğitime muhtaç olduğumuzu hissediyoruz. Bu yüzden bireylerin kendilerini geliştirmeleri açısından hizmet içi eğitimler oldukça önemlidir…

[29] Eğitim sonrasında olayları detaylı araştırma ve farklı açılardan düşünme şansı elde edebilirsin. [Eğitim sonrasında] Daha önce doğru olarak kabul ettiğin şeyler tümüyle yanlış olduğunun farkına varırsın. Bu yüzden ben eğitimin bizler için temel olduğuna inanıyorum…

[30] …Bugünlerde teknolojideki gelişmeler çarpıcı şekilde değişmekte. Yeni ürünler, bizim işimize uyarlamamız gereken yeni prosedürler ile sonuçlanmakta. Uzmanlar da dahil olmak üzere bireyler yeni teknolojileri ve prosedürleri nasıl kullanacaklarına ve nasıl uyarlayacaklarına dair eğitim alarak kendilerini geliştirmeliler…

[31] …İşimde kullanacağım donanımları nasıl kullanacağıma dair her hangi bir eğitim almadım. Hizmet içi eğitim talebinde bulundum. Bunu müdürlüğümüzden sıkça talep ederiz.

[32] …Önceden SASEM isminde bir eğitim ofisimiz vardı. Burada verilen eğitimler üç yıldan daha fazlayı geçmiyordu. Bir kurs bile alsanız bu imkan sadece bir kerelik oluyordu. Bu kursların tekrarı verilmiyordu.

[33] …Bireysel olarak olay yeri inceleme şube müdürlüğünde çalışmak araçlar ve teknolojik ekipmanları kullanabilme kapasitesini gerektirir. Ayrıca, gelişmeye açık ve gerçek bir araştırmacı olunmalı…

[34] …Uzmanlar zihinsel olarak tam kapasitede çalışmalılar. İş görevlerini yerine getirirken kapasiteden yoksun olmamalılar…

[35] Yeni bir araştırma prosedürü tanıtıldığında bizler bu metot ile ilgili olarak özel eğitim alırız. Bu teorik dayanaktan sonra biraz uygulama yaparız. Eğer bu metodu veya tanıtılan donanımı kullanmazsak veya toplanan delilleri bu prosedürü kullanarak analiz etmezsek bununla ilgili tüm teorik ve pratik bilgileri unuturuz. Bu yüzden periyodik olarak uygulama yapmalı veya bu problemi çözecek bir şeyler bulmalıyız.

[36] …Genel olarak sınıf içi eğitimler alıyoruz. Fakat, bu teorik tarafa pratik uygulamalar da eklemeliyiz. Sadece teori ile hiçbir şey olmaz…

[37] ...Deneyim bizim büro için önemlidir. Bir uzman bir problem ile karşılaştığında yeni işe başlamış bir memurdan daha kolay bir şekilde çözüm bulur. Bu yüzden olay yeri inceleme bürosunda en önemli şey bir uzman olmaktır…

[38] …Diğer amirlikler gibi olay yeri inceleme de deneyime dayanır. Bir iş için deneyime sahipseniz iş görevlerinizi otomatik olarak gerçekleştirebilirsiniz.

[39] …Meraklı olmalısınız. Eğitimden sonra ne öğrendiyseniz onu genişletmelisiniz. Bunu yaparak kendinizi geliştirebilirsiniz. Bırakmak yerine kendimizi kriminal servis ve faaliyetlerde geliştirmemiz gerektiğini düşünüyorum…

[40] …Teknolojiyi kullanmak bizim için önemlidir. Günlük yaşamda teknolojiyi kullanıyoruz. Teknolojinin faydalarından iş görevlerimiz için neden faydalanmayalım? Teknolojiye ayak uydurmanın bizim için bir gereklilik olduğunu düşünüyorum. Şu anda kullandığımız yeni sistemin [EPSS] bu boşluğu kapatıyor…

[41] …O [Teknoloji] bana büyük kolaylık sağlıyor. Ayrıca teknolojiyi kullanmayı seviyorum. Bugünün teknolojisini iş görevlerimize uyarlamalı ve ondan faydalanmamız gerektiğini düşünüyorum. Bu yüzden bu sistemin [EPSS] amirliğimiz açısından bir avantaj olduğuna inanıyorum…

[42] …bu yeni sistemden [EPSS] önce ekspertiz raporların yazımı, parmak izlerinin girilmesi ve karşılaştırılması için faklı polis memurları görevlendiriliyordu. Ben sadece parmak izlerini inceliyordum. EPSS'yi kullanarak parmak izlerini sisteme girdim, inceledim ve bazı parmak izi sahiplerini buldum. Şimdi uzmanlık raporunu yazıyorum. Bu sistem yeni görevler yapmama izin veriyor. İşte bu yüzden bizim için önemli olduğunu düşünüyorum.

[43] …birisi iş görevlerini yaparken bilgiler sistemden elde ediliyor. Ayrıca onlar [olay yeri inceleme memurları] destek portalini inceleyebiliyorlar. Birçok içerik sistemin içine yerleştirilmiş durumda. Ayrıca arama yapmak da mümkün. Bunların personele kişisel gelişim açısından katkı sağlayacağını düşünüyorum…

[44] …Çözüm formülü her zaman uzmanlar tarafından hatırlanamaz. Böyle durumlarda kişiler yardım içeriklerini kullanabilir ve faklı destek yapılarını kullanarak çözümü hatırlayabilir…

[45] …Ben onu [EPSS] seviyorum. Eğer birisi kendini geliştirmek isterse bu sistem bunu sağlar… Her şey bireylerin tercihlerine dayanır. Eğer birisi kişisel gelişimine katkı yapmak isterse bu sistemde seçenekler sağlanmakta…

[46] …Uzmanlık raporu yazmak bizim işimiz için önemlidir. EPSS uzmanlık raporunda eksik bölümler bırakmamızı engelliyor. Bu sistemin bize sağladığı en önemli fırsatlardan bir tanesi…

[47] …Uzmanlık raporu yazarken zaman harcamıyorum. Sisteme bir komut yolladığımda rapor oluşturuluyor. EPSS'nin bu özelliğini seviyorum…

[48] …İşimi gerçekleştirmek için onu [içsel bileşen] her zaman kullanıyorum. Zaten sistem benim işimi yönlendiriyor. Şimdi iş görevlerimi şablonlar üzerinden yapıyorum. Ayrıca adım adım ilerleme ve unutulan adımlar için sağlanan mesaj uyarıları EPSS'nin önemli özelliklerinden. Kısaca ben işimi sisteme göre şekillendiriyorum. Yani görevlerimi sistem ile birlikte yürütüyorum…

[49] …Sistem [içsel destek] olay yeri inceleme sürecinde bizim iş akışımızı izliyor. Eksik parça bırakmaksızın program ile tüm incelemelerimizi tamamlıyoruz. Özellikle hatasız olarak uzmanlık raporu oluşturabilmek gerçekten çok iyi.

[50] …Bir butona tıklayarak, bir analiz prosedürü hakkında kısa bilgiler alabiliyorum veya analiz metodunu yapmak için hangi adımların izlenmesi gerektiğini görme şansım var…

[51] …Özellikle yardım butonu [?] iş görevlerimizi hatırlatmak anlamında yararlı. Doğru prosedürü izleyip izlemediğimi anlamak için bile kendi adımlarımı kontrol ediyorum. İşte bu yüzden bu [EPSS] iyi…

[52] Bilgilerimiz, kabiliyetlerimiz ve becerilerimiz açısından içeriklerin sistem [Destek Portali] içerisine yerleştirilmesi önemlidir. Sistem içerisinde delillerin nasıl toplanacağı ve paketleneceği ile ilgili bilgiler bulabiliyorsun. Mesela, analizlerin nasıl yapılacağını da öğrenebilirsiniz ve adli deliller belgeler içerisinde kullanılmadığı zaman sistem üzerinden görüntülenebiliyor…

[53] …Bence bu kısım [Destek Portali] büro amirliklerinde fazla iş yükü olmadığı zamanlarda kullanılmalı. Portal üzerinde birçok seçenekler [destek yapıları] mevcut. İşinizle ilgili bir problemi çözeceğini düşündüğünüzde tıklıyorsunuz ve destek alıyorsunuz. Şu şekilde ifade edebilirim ki bu çok iyi çünkü prosedürleri hatırlamamda bana yardım ediyor. Biliyorum ki gerekli olan herşeyi bulabilirim…

[54] …Resmi olmayan ortamlarda bilgi paylaşmayı sağladığı için arkadaşlarımız için bu gerçekten yararlıdır. Örneğin, portalde herhangi bir sabotaj olayında ne yapacağın veya olay yerinden hangi delileri toplayacağın paylaşabildiğimiz ve çözüm bulabildiğimiz sorulardan.

[55] …Örneğin, sistem [EPSS] ile uzmanlık raporlarının oluşturlması gerçekten çok iyi. Sadece yaptığım süreci başlatmak. Sonra, inceleme sonucumu veri olarak sisteme giriyorum. Sonra sistem tüm süreci yazıyor. Ben sadece raporun çıktısını alıyorum ve imzalıyorum. Son olarak raporumu ilgili büro amirliğine teslim ediyorum…

[56] …Verileri elle girmek yerine veri olarak girerken rapor [uzmanlık raporu] otomatik olarak oluşturuluyor. Bu özellik daha fazla detaylı parmak izi incelemesine zaman ayırmamı sağlıyor…

[57] …EPSS'nin en önemli avantajı uzmanlık raporlarını oluşturarak işimizi kolaylaştırması ve inceleme metotlarını otomatik olarak yazmasıdır. Demek istediğim inceleme zamanını ve toplanan delilleri yazmak için zaman harcamıyoruz. Tekrarı önlüyor. En önemli avantajının hazırlanan raporların hızlı olarak alınması ve yazdırılması olduğunu düşünüyorum.

[58] …EPSS'nin sağladığı en önemli özelliklerden birisi de tüm şube müdürlüğündeki tüm iş akışı ve inceleme süreçlerini izleyebilmemizdir. Ayrıca, büro amirlikleri içiresindeki tüm yazışmaları izleyebiliyoruz. Bu veri bireylerin performansını yönetmede ve değerlendirmede çok büyük katkı sağlıyor…

[59] …Veriler performans yönetimi için kullanıldığında bir çok iş görevlerinin nasıl yapıldığını, ne kadar suç işlendiğini, olay yerlerinden ne kadar delil toplandığını, kaç tane parmak izi bulunduğunu ve belirlenen parmak izlerinin kaç tanesinin önceki suçlular ile eşlendiğini öğrenebiliyoruz. Kısaca, tüm performans verilerini elde edip yorumlayabiliyoruz…

[60] …Fazladan şeyler yapmayacağım. Onun yerine sistemi [EPSS] kullanarak her şeyi yapacağım. Örneğin, performans istatistiklerini hesaplamayacağım. Bir sürü zaman kaybetmeyeceğim. Sadece verileri gireceğim ve DVD lerimi yazacağım. Diğer gerekli bilgiler otomatik olarak elde ediliyor ve kolayca gösteriliyor…

[61] …EPSS'nin iş performansına etkisini göstermek için şunu söyleyebilirim. Bir arama butonuna tıklayarak sistem [içsel destek] içerisindeki her hangi bir delili bulabilirim. Hatta on gün önce ilgili yere gönderilmiş olan bir delilin bulunduğu yeri bulabilirim. Bu iş performansımı arttıran bir faktördür…

[62] …Geçmiş incelemelerden bilgi elde etmek çok önemlidir. Şimdi bunu yapabiliyorum. Bu özellik iş görevlerim için bana zaman kazandırıyor. Bir delilden toplanan her hangi bir parmak izi takip edilebiliyor. Bu aynı zamanda şu anlama da geliyor, beş yıl önce işlenmiş bir olay ile ilgili her hangi bir bilgiyi elde edebiliyoruz ve bu olayın inceleme süreçleri ile ilgili tüm dijital verileri alabiliyoruz…

[63] …Sistem [içsel destek] hem ne yaptığınızı hem de bir sonraki adımda neyi izlemeniz gerektiğini size gösteriyor. Doğruluğu sağlayarak ilerliyorsun. Yanlış yapma olasılığı ciddi anlamda düşüyor…

[64] …Örneğin, olay yeri inceleme ekibi üç parça delil toplamış ve bana sadece iki parçasını iletmişlerse hemen onlara eksik parçayı soruyorum. Çünkü sistemden tam sayıyı görebiliyorum. Bu bizi yanlış yapmamızı engelliyor…

[65] …Bu sistem [EPSS] ülke çapında bir standardizasyon sağlıyor. Bizlere tek tip rapor yazma imkanı sağlıyor. Bu bizler için güzel bir çıktı. Eğer bir olay yeri inceleme memuru farklı bir ile tayin edilirse hiçbir zaman sisteme uyum sağlamada zorluk yaşamayacak…

[66] …Eğer fakl bir ile tayininiz çıkarsa adli süreçler açısından farklı uygulamalar ile karşılaşırsınız. Bu program [EPSS] standardizasyonu oluşturacak. Bizim en büyük eksikliğimiz: standardizasyondur. Bu sistem bu problemi çözüyor…

[67] …Bazen bir günde elli uzmanlık raporu yazmak zorunda kalıyorum. Bu görevler ofisimde zamanımın yarısını alıyor. Ayrıca, tüm uzmanlık raporlarını aynı kalitede yazamıyoruz çünkü uzmanlık raporu yazmada aynı yeteneklere sahip değiliz. Ayrıca raporlarımız bazı standartları sağlamak zorunda mesela %100 doğruluğu saplamalı. Standardizasyon sağlanacak…

[68] …Bu program [EPSS] bir sistem ve bir rapor formatı ile tüm olay yeri inceleme bürolarında standardı sağlayacak. Sistemi kullanmak için acele ediyoruz…

[69] …Sistemden önce büyük bir olay ile karşılaştığımızda düşünün ki olay yerinden otuz parça delil toplanıyor. Raporumda tüm bunları ayrıntılı bir şekilde elle yazmam gerek. Şimdi ise toplanan delilleri otomatik olarak görebiliyoruz. Tabii ki zaman kazanıyorum ve daha fazla delil analiz ediyorum…

[70] …Benim işlerimi kolaylaştırıyor [EPSS]. Performansımı artırıyor. Eğer benim işimi bir girdi olarak düşünürseniz günlük görevlerimi artırıyor. Fakat, şunu söyleyebilirim ki benim toplamda iş yükümü azaltıyor…

[71] …üretilen görevler ve çıktılar yönetmeliklerle uygun olmalıdır. Bizim amacımız ne? Toplanan dililer analiz edilmeli ve ilgili makama iletilmelidir. Bu yüzden raporlar ve diğer çıktılar yüksek kalitede olmalıdır. Hata yapma problemini çözmek adına sistem [EPSS] işlerimiz için gerçekten etkili…

[72] …iş akışı gerçekten güzel. Sistem [EPSS] ile çok fazla hata yapma şansımız yok. Detaylandırılmış grevler ile ilgileniyoruz. Birçok adli ayrıntı var. Bu yüzden çıktılar sıfır hataya sahip olmalı. Sistemi kullanarak örneğin rapor kalitesi yükselecek…

[73] …Vatandaşlar bu çalışmalara teknolojik ilerleme olarak bakıyorlar. Bu yüzden bu çalışmalar polisin genel imajını artırır çünkü işini yaparken memurlar teknolojik donanımları kullanıyorlar diye düşünecekler. Tabii ki sorumlu olarak davranıyoruz. Fakat incelmeyi bilgisayar yardımı ile yaptığımızı görüyorlar ve farklı gözlerle bakıyorlar…

[74] …Bu [EPSS] çok yararlı olacak. Örneğin vatandaşlar bizim teknoloji ile çalıştığımızı ve bu yüzden kriminal adalet sisteminde boşluk olmadığını düşünecekler. Çünkü bağlantısız adımlar olmadığını görüp bize daha fazla güvenecekler…

[75] …Bir şehir [Olay yeri inceleme amirliği] bir prosedürü izlerken diğer bir şehir tümüyle fakl metotları izliyor. Şimdi bir standart getirdik. Biyometrik ver işlemleri, olay yeri inceleme ve laboratuvar büro amirlikleri tarafından yazılan uzmanlık raporların ilk kontrol edilen ve okunan bölümler olması çok önemli. Raporların standardizasyonu işlerini gerçekten kolaylaştıracak. Ben inanıyorum ki bu sistem [EPSS] hem mahkemeler hem de savcılar için çok büyük yararı olacağına inanıyorum…

[76] …EPSS benim iş görevlerimi kolaylaştırıyor. Aynı şekilde mahkemeler ve savcılar da bu gelişmelerden yararlanacaklardır çünkü daha detaylı ve standart uzmanlık raporları görecekler.

[77] …Genel olarak bu sistem mahkemelerin karar verme süreçlerini hızlandıracaktır. Delil ceza yargılama sisteminde en önemli süreçtir. Delillerin toplanması, paketlenmesi ve incelenmesi bizim çok zamanımızı harcamaktadır. Delil zinciri ceza yargılama sisteminde en önemli unsurlardan biridir. Bizim süreçlerimiz hızlanacağı için bu zincir de aynı oranda hızlanacaktır. Bu ana etkidir. Mahkemeler ve savcılar delil bilgilerine kolayca ulaşabilecekler. Bu yüzden adli davalar hızlıca çözülecektir…

[78] …Her ne kadar laboratuvar tarafından geliştirilen izlerden uzmanlık raporlarına transfer edilmelerini okuyabilsem de hala iz ve alındığı yüzey ile bir bağlantı kuramıyor ve emin olamıyorum. Sistemden fotoğrafları görme şansım olsaydı tüm bu sorular cevaplanırdı. Bunun sisteme dahil edilmesi gerektiğini düşünüyorum…

[79] …İncelediğimiz ve geliştirdiğimiz delil fotoğraflarını gönderebilmeyi istiyorum. Eğer onlar [Biyometrik veri işlemleri büro amirliği] fotoğrafları dijital olarak beklemeden sistem yardımıyla görebilirlerse bunun onlar için yararlı olacağını düşünüyorum. Bu özelliğin eklenmesi gerektiğini düşünüyorum…

[80] …Sevmediğimi söyleyemem. Fakat bu sistem [EPSS] renklendirme bölümleri içermeli. Menüler ve süreçler renklendirilmeli. Aktif öğeler ve çalışılan menüler farklı renklerde görülebilir. Bu sistem daha fazla renk kullanılarak geliştirilebilir…

[81] …Ek bir seçeneğin sisteme [EPSS] eklenmesine gerek olmadığını düşünüyorum. Genel anlamda sistem iyi. Hatta mükemmele yakın görünüyor. Sistemin görsel tasarımı değiştirilebilir, fakat ileride daha sonra yapılacaktır…

APPENDIX J

PERMISSION FROM ETHIC COMMITTEE

FEN BİLİMLERİ ENSTİTÜSÜ
GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES

ORTA DOĞU TEKNİK ÜNİVERSİTESİ
MIDDLE EAST TECHNICAL UNIVERSITY

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Sayı:B.30.2.ODT.O.40.O5.O2/126/ 2877 18.10.2012

GÖNDERİLEN: Prof. Kemal Önder Çetin
Rektör Danışmanı

GÖNDEREN: Prof.Dr.Gürsevil Turan
Fen Bilimleri Enstitüsü
Müdür Yardımcısı

KONU :İlker Yakın hk.

Bilgisayar ve Öğretim Teknolojileri Eğitimi EABD doktora programı öğrencisi İlker Yakın'ın 30 Ekim - 15 Aralık 2012 tarihleri arasında "*Olay yeri inceleme birimlerinde kullanılmak üzere geliştirilen performans destek sistemi(EPDS) için birey başarım teknolojisi modeli, Gilbert'in davranış mühendisliği modeli ve Kirkpatrick'in dört seviyeli değerlendirme modeli kullanımı: Modellerde neler çalıştı?*" başlıklı araştırmasına ilişkin hazırlanan anketi Emniyet Genel Müdürlüğü – Kriminal Polis Laboratuvarları Daire Başkanlığı – Olay Yeri İnceleme Birimlerinde uygulama yapmak için görevlendirilme başvurusu incelenmiş; ilgili danışman görüşüne dayanarak adı geçen öğrencinin isteği doğrultusundagörevlendirilmesi Etik Komite onayı koşulu ile uygun görülmüştür.

Gereği için bilgilerinize saygılarımla sunarım.

Ek: EYK kararı ve ekleri

Etik Komite Onayı

Uygundur

18.10.2012

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

APPENDIX K

PERMISSION FROM GENERAL DIRECTORATE OF THE TNP AND THE CRIMINAL POLICE LABORATORIES DEPARTMENT

EĞİTİM FAKÜLTESİ DEKANLIĞI
Ev. Arş. Md. Saat :

T.C.
İÇİŞLERİ BAKANLIĞI
Emniyet Genel Müdürlüğü

Sayı : B.05.1.EGM.0.34.10.01. 236 – 3023 – 2386-112731
Konu : Performans Yönetimi.

01/07/2009

ORTA DOĞU TEKNİK ÜNİVERSİTESİ
EĞİTİM FAKÜLTESİNE

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

İlgi sayılı yazınız 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 kullanılabilmesinin uygun olduğuna dair alınan Makam Oluru fotokopisi ilişikte gönderilmiştir.

Bilgilerinize arz ederim.

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

EK:
1-) Makam Oluru Fotokopisi (1 Adet-1 Sayfa)

10.07.09 013517

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

T.C.
İÇİŞLERİ BAKANLIĞI
Emniyet Genel Müdürlüğü

K-Q
TSE-ISO-EN
9000

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 L

MEAN SCORES AND STANDARD DEVIATIONS ON PERFORMANCE RELATED ITEMS (Phase I)

	Items	M.	S.D.
P1	Expectations are generally pretty high at CSI Unit	6,20	1,25
P2	My attitude about working at CSI Unit is very positive.	6,32	1,19
P3	My job is an important responsibility.	6,81	0,70
P4	Our job descriptions are well designed.	5,58	1,52
P5	Our supervisors take the time to coach us when we need help.	5,10	1,90
P6	Part of our job is to get involved in solving problems.	6,12	1,35
P7	Resources to do the job are available when needed.	5,55	1,48
P8	The work I do is important to the TNP.	6,78	0,72
P9	I have enough time to complete my job tasks.	5,78	1,57
P10	Training is provided when conditions on the job change.	5,39	1,77
P11	We all know each other and know our way around the place.	6,18	1,14
P12	We have high performance standards in the CSI Unit.	5,64	1,42
P13	We have the tools and equipment we need to get the job done.	5,86	1,31
P14	We often receive feedback from my supervisors about my work.	4,90	1,91
P15	We routinely participate in decisions about our jobs.	5,28	1,73
P16	I know why my job is important for the unit and the section.	6,71	0,75
P17	The work I do on my job is meaningful to me.	6,74	0,72
P18	I have the necessary dexterity to do job.	6,53	0,80
P19	We have written job descriptions for each position in the unit, specifying the competencies that are expected for the position.	5,92	1,32
P20	I can manage daily problems independently and efficiently.	6,36	0,96
P21	I have sufficient skills for the assigned job tasks.	6,58	0,74
P22	I have the needed experience to be successful at my job.	6,46	0,89
P23	I understand the consequences of both good and poor performance.	6,61	0,78
P24	I have the technical concepts to perform well.	6,44	0,85
P25	I have required competency to perform my job.	6,64	0,74

APPENDIX M

MEAN SCORES AND STANDARD DEVIATIONS ON ORGANIZATIONAL PERFORMANCE RELATED ITEMS (Phase I)

Items		M.	S.D.
O1	My organization has made good use of my knowledge and skills in looking for ways to become more efficient.	5,44	1,64
O2	Overall, the quality of work performed by current coworkers in my immediate work group is high.	6,03	1,20
O3	In general, all are treated with respect in my organization, with no regard to status and grade.	5,72	1,62
O4	It is rare to make big mistakes in my organization when conducting work.	5,76	1,50
O5	The occurrence of goal attainment is very high in my organization.	6,04	1,11

CURRICULUM VITAE

PERSONAL INFORMATION

Surname, Name : YAKIN, İlker
Nationality : Turkish (TC)
Date and Place of Birth : 12 May 1980, Çanakkale
Marital Status : Married
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EDUCATION

Degree	Institution	Year of Graduation
Ph. D.	Middle East Technical University, Department of Computer Education and Instructional Technology	2012
BS	Gazi University, Department of Secondary Science and Mathematics Education, Mathematics Education	2003
High School	İbrahim Bodur High School, Çanakkale	1998

WORK EXPERIENCE

Degree	Institution	Enrollment
2004 September -	Middle East Technical University, Department of Computer Education and Instructional Technology	Research Asistant

FOREIGN LANGUAGES

Advanced English

SELECTED PUBLICATIONS

Articles

Tinmaz, H., & Yakin I. (2011). An Extended Overview of Information and Communication Technologies in Turkey. *International Review of Turkish Studies*, *1*(3), 74-89.

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Tinmaz, H., & Yakin, I. (2006). The Impact of Contemporary Internet Utilization on Preservice Teachers' Tertiary Education: A Preliminary Study From "Computer Education and Instructional Technology" Departments. *2nd International Open and Distance Learning (IODL) Symposium*, (pp.299-314). Eskişehir, Turkey, 13-15 September 2006.