2016

Evaluating the Enterprise Resource Planning (ERP) Systems' Success at the Individual Level of Analysis in the Middle East

Mohammad Alzoubi
Nova Southeastern University, alzoubi@nova.edu

Evaluating the Enterprise Resource Planning (ERP) Systems' Success at the Individual Level of Analysis in the Middle East

by

Mohammad Alzoubi

A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy
in
Information Systems

College of Engineering and Computing
Nova Southeastern University

2016

We hereby certify that this dissertation, submitted by Mohammad Alzoubi, conforms to acceptable standards and is fully adequate in scope and quality to fulfill the dissertation requirements for the degree of Doctor of Philosophy.

_____ _____

Steven R.Terrell, Ph.D. Date
Chairperson of Dissertation Committee

_____ _____

James Parrish, Ph.D. Date
Dissertation Committee Member

_____ _____

Frank Nasuti, Ph.D. Date
Dissertation Committee Member

Approved:

_____ _____

Amon B. Seagull, Ph.D. Date
Interim Dean, College of Engineering and Computing

College of Engineering and Computing
Nova Southeastern University

2016

An Abstract of a Dissertation Submitted to Nova Southeastern University in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

Evaluating the Enterprise Resource Planning (ERP) Systems' Success at the Individual Level of Analysis in the Middle East

by
Mohammad Alzoubi
April 2016

Although ERP systems have been depicted as a solution in many organizations, there are many negative reports on ERP success, benefits, and effect on user's performance. Previous research noted that there is a lack of knowledge and awareness of ERP systems and their overall value to ERP organizations. ERP systems have been widely studied during the past decade, yet they often fail to deliver the intended benefits originally expected. One notable reason for their failures is the lack of understanding in users' requirements. This dissertation study was designed to understand the relative importance of system quality (SQ), IQ (IQ), service quality (SVQ), and their influence on ERP users. The dependent variable individual impact (II) was used to represent the ERP success at the individual level of analysis. The research by Petter, DeLone, and McLean (2008) established the basis for this research. In addition, this study examined the moderating effect of users' characteristics variables (age, gender, experience, and position) on the II variable. The study further compared the results of this research with Petter et al.'s (2008) research to test whether the overall findings of this research differ from their research. A web-based survey was used to collect data for this study. A number of ERP users from private and public sectors in the Middle East participated in this survey. The survey screening process provided 218 usable responses for further analysis. Using SPSS 23, the researcher determined the validity and reliability of the items. The result of the exploratory factor analysis (EFA) via principal component analysis (PCA) loaded SQ items on four components, IQ on three components, SVQ on one component, and II on one component. Following the EFA results, the researcher investigated the items' reliability, internal consistency, convergent validity, and discriminant validity. Hypothetical relationships were examined using structural equation modeling (SEM) based on the partial least squares (PLS) technique. The moderating effect was examined using the multigroup analysis (MGA) method. This dissertation study contributed to the body of knowledge by highlighting the importance of SQ, IQ, and SVQ in impacting ERP users' learnability, awareness/recall, decision effectiveness, and individual productivity in an ERP environment. The results of this research can be used by ERP vendors to deliver an integrated and customized ERP system to organizations based on region. This research bridged the gap in the literature on the need to conduct more ERP research in the Middle East. Understanding the relative importance of information systems (IS) success factors brings the attention of ERP organizations and vendors to focus their efforts on the leading issues perceived by end users. Assessing the level of IS impact from multiple users may

help organizations to offer all types of training to develop better attitudes toward ERP systems. Organizations can also build a rigorous approach to assess the impacts of IS on ERP users' performance and productivity. As a result, this could help in improving productivity, learnability, awareness, and decision effectiveness of the end users.

Acknowledgments

I would like to thank Dr. Steven Terrell and the committee members, Dr. Frank Nasuti and Dr. James Parrish, for their guidance, support, thoughtful comments, and encouragement throughout this dissertation process. Your guidance, support, and encouragement made me believe that I can complete this dissertation process through extensive effort and commitment. Without this support, I would not be able to achieve anything today. Thank you Dr. Terrell for creating an atmosphere that encouraged learning and development.
Special thanks to Dr. Ling Wang for reviewing and approving the IRB form.
Special thanks to Dr. Littman, Dr. Levy, Dr. Zink, Dr. Sun, and Dr. Thurmond for their outstanding role during the course work.
As a student at NSU, I would also like to express my profound gratitude to Dr. Seagull and the administration in the College of Engineering and Computing at Nova Southeastern University for their support, level of communication, and professionalism during the time of my study.
I would like to thank my father, brothers, and sisters for their encouragement.
I would like to thank my wife, Manar for her support during the time of my study.
Finally, I would like to dedicate this achievement to my children, Omar, Sami, and Zena.

Table of Contents

List of Tables

Tables

List of Figures

Figures

Chapter 1

Introduction

Background

Enterprise resource planning (ERP) is the most complex and largest enterprise system, providing cost effectiveness, improved operations, business growth, and support for business processes across the enterprise (Tsai, Chen, Hwang, & Hsu, 2010). The use of ERP is growing and becoming more popular; however, it is obvious that several important factors must be considered for the success of any ERP system. According to Petter, DeLone, and McLean (2008), an ERP system is a tool that manages procedures and resources; therefore, it is imperative for organizations to have this tool to facilitate the coordination of several activities within the organizations. Levi and Doron (2013) claimed that organizations consider ERP to be a vibrant tool for business success because it integrates varied business functions and enables flawless transactions and productions.

Although ERP systems have been depicted as a solution in many organizations, there are many negative reports on ERP success (Levi & Doron, 2013). The ERP systems are designed to provide solutions to many different business issues and needs. According to Amoako-Gyampah (2007), the ERP systems take advantage of a series of advanced technologies to provide transaction solutions and help different organizations share knowledge and data, reduce costs, and improve business processes.

Al-Turki (2011) noted that the performance of new technology implies that technical and cultural factors play a great role in achieving a successful ERP system that may have been initially built for more developed countries.

Al-Fawaz, Eldabi, and Naseer (2010) noted that various vendors provide ERP solutions to organizations in the Middle East to help them stay competitive in the global market. According to Soja and Paliwoda-Pękosz (2013), the process of information systems (IS) acceptance in developing countries is associated with different considerations as compared with acceptance observed in developed countries. In particular, IS projects conducted in developing countries struggle with lack of experience, inadequate infrastructure, and lack of strategic planning. According to Kujala (2008), despite the huge investments in ERP systems, ERP failures have been noted in many organizations. It is obvious that the benefits of ERP systems depend partially on how they are perceived by end users.

ERP systems have been widely studied during the past decade, yet they fail to deliver the intended benefits originally expected. One notable reason for their failures is the lack of understanding of users' requirements (Abugabah, Sanzogni, & Poropat, 2009). Petter et al. (2008) used an IS success model to explain information system success at the individual and organizational level of analysis. The authors included factors such as system quality (SQ), IQ (IQ), and service quality (SVQ) to measure their relative importance to end users. The authors concluded that the three factors do have an impact on ERP success at the individual and organizational level of analysis.

The importance of identifying the key factors that determine the IS success at the individual level is necessary for ERP success in the workplace, in different cultures. It has

been noted that there is a link between cultural differences and ERP success or failures. According to Talet and Alwahaishi (2011), ERP systems used successfully in one region may be a failure in another region. Zaglago, Apulu, Chapman, and Shah (2013) argued that using an ERP system that has been developed in one region or culture involves more than simply focusing on the technical issues of using the software.

According to Hatamizadeh and Aliyev (2011), ERP systems have been widely used by organizations in developed regions. Regions such as Asia and the Middle East are moving toward implementing ERP systems and are in need of better understanding of the key factors behind ERP success. According to Zaglago et al. (2013), factors that influence ERP success have not been widely studied in the context of regions other than developed regions.

Problem Statement

The use of new technology, especially when the technology is intended to replace a legacy system is considered a tedious task. Salim, Suleiman, and Salisu (2015) asserted that the introduction of new technology is fraught with problems that are often linked to inadequate requirements, end-user resistance to adapting to a new technology, and lack of management support. Ramdani (2012) noted that the question of the ERP system's value to the end users has been a key issue in many organizations. According to Koch (2011), ERP users can influence the success or failure of the ERP system. Peslak and Boyle (2010) suggested that users play an important role in achieving success in an ERP environment. Despite the large body of literature on ERP systems, there is a need to investigate the ERP system's success from the end users' perspectives (Kwak, Park, Chung, & Ghosh, 2012).

Various factors relevant to ERP success or failure have been highlighted in past research; however, the focus has been on ERP success in developed countries. Moreover, many developing countries express interest in achieving ERP success in their organizations. Talet and Alwahaishi (2011) argued that an ERP system used successfully in one region might be a failure in other regions. According to Soltani, Elkhani, and Bakri (2013), the factors that affect ERP success in developed countries need to be researched in the context of developing countries. According to Zhu, Li, Wang, and Chen (2010), ERP systems have been utilized globally, yet they have failed to deliver the intended benefits.

To provide a better understanding of ERP success at the individual level of analysis, this research explored the factors that influence ERP users in an ERP environment in the Middle East. An understanding of the factors that influence end users in an ERP environment is imperative for ERP success.

Given that the majority of the referenced research studies have been conducted in developed countries, this research was conducted in the Middle East to bridge the gap in ERP research.

Dissertation Goals

The three main goals of this research are:

1. The first goal was to understand the factors that contribute to ERP success at the individual level of analysis in an ERP environment in the Middle East.
2. The second goal was to determine whether the relative importance of the IS factors differ between the research results in this study and the research results found in Petter et al.'s (2008) summarized research.

3. The third goal was to determine whether users' characteristics (UCs) moderate the relationships between SQ, IQ, SVQ and the II variable. The effect is examined using the multigroup analysis (MGA) method (Henseler, Ringle, & Sinkovics, 2009).

The dissertation study investigated the level of importance of SQ, IQ, SVQ, and UCs at the individual level of analysis. Improving decision-making quality and productivity is evidence of an ERP success at the individual level. To understand better the level of importance of the different factors, this research study used a model from Petter et al.'s (2008) research. The research employed a quantitative approach to discover the items in SQ, IQ, II, and SVQ necessary to bring positive results to ERP users.

Relevance and Significance

To stay competitive, organizations often implement new ways of creating business and gain efficiencies to serve their customers. Many organizations are in the process of implementing ERP systems, while many other organizations have several years' experience in maintaining their ERP systems. A study by Lin, Singer, and Ha (2010) indicated that it is imperative for organizations to integrate technologies to meet government mandates, enhance processes, and increase performance.

Many organizations reported success in implementing their ERP systems; however, Iskanius (2010) estimated the failure rate of ERP systems to be as high as 70%. Given the high failure rate, top management has come to realize that achieving ERP success is a very complex task.

Researchers have reported that many organizations have been unable successfully to extend and utilize their ERP systems to achieve success (Peng & Nunes, 2009; Zhu et al., 2010). Caruso (2009) argued that employees play a key role in the success of any organization; therefore, it is critical to identify and understand factors that largely impact users in an ERP system environment.

Following from the above, the results of this study could be used to help organizations understand the factors that influence end users in an ERP environment. Nah, Tan, and Beethe (2005) asserted that the benefit of an ERP implementation depends heavily on how the system is operated by end users. Understanding the relative importance of end users' success factors in ERP systems can help information technology (IT) managers put more emphasis on the leading issues perceived by end users (Hsu, Lai, & Weng, 2008).

Research Questions

To achieve the goals of the dissertation study, the following research questions were addressed.

Research Question One: What are the critical factors for SQ, IQ, and SVQ?

Research Question Two: Which of the latent variables SQ, IQ, and SVQ have the highest level of importance to the II variable?

Research Question Three: Is there any moderating effect of UCs on the strength of the relationship between the independent variables and the dependent variable?

Research Question Four: Do the findings of this research differ from the findings of Petter et al.'s (2008) research results?

Research Hypotheses

Following from the research questions, research goals, and review of the literature, the study provided the following hypotheses:

H1: *There is a positive relationship between the SQ factors and the II factors.*

H2: *There is a positive relationship between the IQ factors and the II factors.*

H3: *There is a positive relationship between the SVQ factors and the II factors.*

H4: *There is a moderating effect of UCs on the relationship between the independent variables and the dependent variable.*

Barriers and Issues

It is essential to address several issues for the successful completion of this study. The following points explain some of the barriers and issues for the research study:

- Finding ERP users in different organizations in the Middle East: Finding ERP users was helped by identifying potential users in social network sites, marketing organizations, and user groups. Referrals were also used to identify ERP users.
- Gaining the cooperation of the respondents to participate in the survey. Respondents were assured that there will be no request for sensitive or confidential information, and that this study is purely academic in nature.

Altruism for academic research was successful in gaining cooperation from professional societies and user groups. The instrument used for data collection was the SurveyMonkey website. The company has a great reputation with regard to transferring and managing survey records in a secure manner. The following issues were also addressed in the survey.

- ✓ Users were informed and assured that no personal data will be collected in the survey.
- ✓ The survey used a Likert scale for all questions; therefore, there was no option for the users to enter their personal information by mistake.
- ✓ The topic of interest was not of a sensitive nature.

Assumptions

Based on the research goals, the study makes the following assumptions:

1. The research participants provided open, honest, and complete responses about their ERP experiences.
2. The ERP users were able to interpret and understand the survey questions.

Limitations and Delimitations

Limitations

A number of limitations may have existed for the dissertation study:

1. Some participants may have ignored answering all survey questions. A number of cases were identified as missing values.
2. The accuracy of responses to the questions depends on participants' truthfulness in their responses to the survey items, as well as on their prior experiences with the ERP systems.
3. Data collected through questionnaires are subject to participant bias.

To overcome some of the limitations mentioned above, the researcher targeted many ERP users to guarantee sufficient data and consequently more accurate results.

Delimitations

To maintain the scope of this study limited to the research goals, a number of delimitations existed for the dissertation study:

1. The study did not conduct primary research in developed countries.
2. The sample size did not reflect all sectors' populations in the Middle East.
3. The research did not focus on one functional area in a given organization.

Definitions of Terms

The following terms were used throughout this dissertation.

Critical Success Factors (CSFs)–These are factors that must be carefully selected to insure successful implementation or upgrade of an ERP system. Bingi, Sharma, and Godla (1999) suggest that ERP adopters for the success of ERP implementations must understand CSFs.

Enterprise Resource Planning–An ERP system is an integrated system that integrates varied business functions and enables flawless transactions and productions (Levi & Doron, 2013).

End Users–End users are users who are working with the ERP system as part of their routine operational duties (Esteves, Pastor, & Casanovas, 2003).

Information Quality–IQ is concerned with the timeliness, accuracy, and relevance of the information (Abugabah et al., 2009).

Success–In the context of this research, an ERP success can be defined as the extent to which end users believe that the intended system improves their job productivity and decision quality in an ERP environment.

System Quality–SQ is concerned with reliability, correctness, and consistency of the system (Abugabah et al., 2009).

Service Quality–DeLone and McLean (2008) define SVQ as "the quality of the support that systems users receive from the IS department and IT support personnel."

Users' Characteristics–these are concerned with education, experience, gender, age, and position.

List of Acronyms

CSFs	**Critical Success Factors**
CFA	**Confirmatory Factor Analysis**
D&M	**DeLone and McLean Model**
ERP	**Enterprise Resource Planning**
EFA	**Exploratory Factor Analysis**
II	**Individual Impact**
IQ	**Information Quality**
MGA	**Multigroup Analysis**
PCA	**Principal Component Analysis**
PLS	**Partial Least Squares**
SQ	**System Quality**
SPSS	**Statistical Package for the Social Sciences**
SVQ	**Service Quality**
UCs	**Users' Characteristics**

Summary

Chapter one highlighted the problem statement, research goals, research questions, hypotheses, significance, barriers and issues, limitations, and delimitations of the

dissertation study. In addition, it included a list of terms that appear in the study. In this chapter, the research study argued that understanding factors that influence end users in an ERP environment is imperative for ERP success. The dissertation study identified five variables (SQ, IQ, SVQ, II, and UCs) for the research model. In addition, the study referenced previous research to compare the research results. The result of this research can be used to help vendors deliver customized ERP systems based on region. This research bridged the gap in the literature on the need to conduct more ERP research in the Middle East. Understanding the relative importance of IS success factors brings the attention of ERP organizations and vendors to focus their efforts on the leading factors perceived by end users. Assessing the level of IS impact from multiple users may help organizations to provide the proper training for the right employees to develop better attitudes toward the system. Organizations can also build a rigorous approach to assess the impacts of IS on ERP users' performance and productivity. As a result, this could help in improving productivity, learnability, awareness, and decision effectiveness of the end users.

Chapter 2

Review of the Literature

Overview

This section provides an overview of the ERP systems, their evolution, benefits, and reasons for implementing them. In addition, it provides an overview of existing literature on ERP systems' evaluation and success. The main goal of this section is to review the literature and discuss ERP systems in general for the purpose of identifying research gaps. Levy and Ellis (2006) pointed out that "an effective literature review enables researchers to be aware of an existing body of knowledge, and helps them understand where new research is needed" (p. 183).

ERP History

Kalakota and Robinson (2001) indicated that ERP systems have their roots in Materials Requirement Planning (MRPI) systems, and Manufacturing Resource Planning (MRPII), which emerged during the 1960s. MRPI was mainly used for inventory control and managing production, while MRPII was developed to evaluate the entire production environment and to create or adjust master schedules based on feedback from current production and purchase conditions (Bedworth & Bailey, 1987). The development of these manufacturing coordination and integration methods and tools made ERP systems possible. Companies such as SAP, Oracle, and others moved away from legacy MRPII systems and began the process of ERP implementation. An ERP system can be defined as

a program that intends to provide solutions to and interface multiple corporate functions, including finance, human resources, manufacturing, materials management, and sales into a unified database system (Davenport, 2000). Key data components of an ERP system are presented in Figure 1 below (Sayegh, 2010).

Figure 1. Components of an ERP System (Sayegh, 2010).

ERP Benefits

Zeng, Lu, and Skibniewski (2012) summarized the benefits that can be gained from the ERP system, which they classified into five different dimensions:

- Operational benefits: ERP systems can provide benefits in terms of cost, cycle time, performance, and quality.
- Managerial benefits: ERP systems can improve decision-making and planning.
- Strategic benefits: ERP systems can support business growth and innovations.
- IT infrastructure benefits: ERP systems provide flexibility for current and future changes.

- Organizational benefits: ERP systems are expected to empower workers and build a common vision.

Despite the fact that ERP systems can provide many benefits, researchers have reported that many organizations have been unable to utilize successfully their ERP systems to achieve success (Peng & Nunes, 2009; Zhu et al., 2010).

ERP Lifecycle

The success of an ERP system implementation is important to organizations as it improves their existing operations. According to Velcu (2010), the ERP system lifecycle consists of three phases, the project, shakedown, and onward and upward phases. Soja and Paliwoda-Pękosz (2013) noted that the ERP system lifecycle consisted of four phases, the chartering phase, project phase, shakedown phase, and onward and upward phase.

1. Project chartering–concerns business decisions regarding the scope of the project, budgeting, and system selection.
2. The project–the main implementation phase with the purpose of getting the system and users "up and running."
3. Shakedown–stabilizing and incorporating IS in everyday operations.
4. Onward and upward–deriving benefits from the ERP system.

The postimplementation period for ERP systems begins after the implementation phase of an ERP system. The postimplementation phase provides on-going support such as maintenance, training, and upgrades to help organizations sustain and prevent any disruptions to the system. To avoid an IS failure, the system requires continuous support from top management (McGinnis & Huang, 2007; Salmeron & Lopez, 2010). Nicolaou

and Bhattachanya (2008) reported that maintaining the postimplementation phase of an ERP system could support the long-term performance gain and efficiencies of the system. Many organizations upgrade and maintain their ERP systems in the postimplementation phase to prevent any disruptions to the daily operations of the business (Ng, Gable, & Chan, 2002). According to Willis and Willis-Brown (2002), the postimplementation stage has many challenges because the go-live phase signals a new beginning. The performance of the system continues to be challenging but necessary because the system must be extended to satisfy the current and all future business requirements (Muscatello & Chen, 2008; Wei, Liou, & Lee, 2008). Other studies have also noted that one of the main challenges in ERP systems is the high cost of maintenance and support (Law, Chen, & Wu, 2010; Salmeron & Lopez, 2009). Previous studies have indicated that training and education should be provided to end users during the implementation process. It is suggested that organizations apply training to end users during the implementation life cycle of an ERP system (Amoako-Gyampah & Salam, 2004; Woo, 2007).

Information System Success Evaluations

IS evaluation requires a systematic approach to be measured successfully (Jones, 2008). The first step is to understand the context in which the evaluation is being conducted (Farbey, Land, & Targett, 1993). Adelakun and Jennex (2002) classify the most effective approaches to IS evaluation into four major categories: (1) financial, (2) functional, (3) strategic measure, and (4) subjective measure. Stockdale and Standing (2008) argued that the goal of an evaluation is to assess value and measure success.

Many researchers have attempted to find a suitable method to evaluate ERP systems from different perspectives. Chen and Lin (2008) proposed a method to evaluate ERP systems' success. The method entails investigating the financial performance of the organization and the relationship between continuous investment in ERP and technical efficiency. The authors used regression analysis to investigate the relationship between efficiency and the investment in ERP. Other researchers, such as Wieder, Booth, Matolcsy, and Ossimitz (2006) researched the impact of ERP systems from the perspective of business process performance, while Argyropoulou et al. (2008) proposed a framework called the "six imperatives," which incorporates the necessary metrics for the review of ERP systems.

Despite the fact that the above methods were used to evaluate the success of ERP systems, they lack an emphasis on end users' productivity. Following from the previous section, one can note that financial and technical methods are the most popular in ERP systems evaluation. Chun-Chin, Tian-Shy, and Kuo-Liang (2008) argued that the aforementioned approach ignores factors such as SQ and its impact on end users. Quality assessment reflects the characteristics of the system itself and the quality of information. IQ describes the clarity, accuracy, timeliness, and content of the system.

According to Al-Mashari, Al-Mudimigh, and Zairi (2003), ERP projects can be considered successful when: (1) there is a match between the ERP system and the stated objectives, (2) the system is implemented within time and on budget, (3) users' attitudes toward the system are positive, and (4) the system matches users' expectations. Chun-Chin et al. (2008) proposed a study that adopted performance measures, such as data accuracy, output, system accuracy, and usefulness from the relevant literature. The authors noted that

many organizations put their attention on selection and implementation, but fail to evaluate the effectiveness of the ERP systems.

Many studies of ERP systems focus on "user satisfaction" as a measure of a system's success. This construct has been noted as the most-widely used in IS success (Wu & Wang, 2007) to present user satisfaction as an evaluation mechanism for determining system success. Other research found that measuring the success of an IS has been found to be impractical because of the difficulty of recognizing other benefits such as financial benefits and improved productivity (Holsapple et al., 2005).

Wu and Wang (2005) identified two main types of ERP system users: (1) users that are selected from the operating department, and (2) users from where the requirements of the system were initially developed. The authors believe that users have a crucial role in the success of the ERP system. In a later study conducted by Wu and Wang (2006), the authors stated that users' satisfaction is the extent to which the newly installed system meets their information requirements. It is also expected that enhanced productivity will follow. However, the authors suggest that this does not mean that satisfaction causes improved productivity. Rather, they argued that user productivity and satisfaction are caused by the extent to which the system requirements are met.

Previous studies have evaluated IS success using various users, such as regular employees, middle managers, and top managers. Most studies found satisfaction to be the requisite for the success of an ERP system (Chun-Chin et al., 2008). Calisir and Calisir (2004) examined various factors affecting end-users' satisfaction, including systems capability, compatibility, flexibility, user guidance, learnability, ease of use, and perceived

usefulness. The study found that end users' satisfaction is influenced by the various factors noted above.

Mahmood, Burn, Gemoets, and Jacquez (2000) investigated 45 end users' satisfaction studies, concentrating on the relationship between end users' satisfaction and nine other variables: perceived usefulness, ease of use, users' expectations, users' skills, users' involvement in systems development, organizational support, and perceived attitude of top management to the project and users' attitude to IS in general. The results of the study show a positive influence of all variables on end users' satisfaction. According to Fowler and Gilfillan (2003), it is important to identify the end users in any IS project to ensure that their needs are met.

The literature review reveals that there is a lack of research at the individual level of analysis in ERP systems. In considering the discussions above, it is notable that there is a need for more research to evaluate ERP systems from the end user's perspective. Ifinedo and Nahar (2007) conducted a study that measured ERP success from the perspective of the two key organizational groups: business managers and IT professionals. The study concentrated on the utilization of ERP systems to enhance organizational effectiveness.

Zhang, Lee, Zhang, and Huang (2005) assert that the success of ERP systems can be measured in four dimensions: user satisfaction, II, organizational impact, and business performance improvement. Islam and Rasad (2005) conducted a study to evaluate employee performance based on the quality and quantity of work, planning and organization, initiative and commitment, teamwork and cooperation, communication, and external factors. Wang and Huang (2006) offer evidence from an empirical study that

engineers consider end users as the most important measure of project success. Consequently, system factors and services need to be studied in the context of end users.

Howcroft, Newell, and Wagner (2004) emphasize that it is essential for researchers to examine the way that ERP systems are shaped by individuals, organizations, and organizational culture. Concentrating on these features will culminate in better results for organizations. Spathis and Ananiadis (2005) stated that advancing the field of IS evaluation requires the consideration of end users.

Many researchers have considered end users' satisfaction and acceptance, starting with Davis' (1989) model, which explains computer usage and acceptance of information technology. Davis (1989) introduced the Technology Acceptance Model (TAM), which provides an understanding of the impact of external variables on attitudes and intentions to use of an ERP system. The effects of an IS in this model are determined by its perceived usefulness (PU) and perceived ease of use (PEU). The model argues that external variables indirectly affect attitudes toward usage, and in turn lead to an actual system use by the influence of PU and PEU.

TAM was later extended and called TAM2; this extended model added subjective norm as another important factor affecting adoption decisions of users. The model has been tested to prove that PU and PEU are the two main fundamental theoretical constructs.

The following section discusses the various models that have been used for IS research. It follows a critical analysis of previous work that highlights some of the gaps in the field of ERP evaluation studies from the end users' perspectives.

Previous Information Systems Research Models

Chang (2008) clarifies that the Task-technology fit (TTF) model is concerned with the degree to which the outcome of the technology matches the demand of the task. TTF is defined by Goodhue (1995) as "the extent that technology functionality matches task requirements and individual abilities," while Goodhue and Thompson (1995) identified it as the degree to which technology can assist an individual to perform a task.

Previous research studied the factors that influence end users' performance in an ERP environment. The authors tested a structural model of TTF, which includes satisfaction and performance in an ERP environment. The authors concluded that the TTF model does not answer the question of what characteristics of a system lead to improved user performance (Kositanurit, Ngwenyama, & Bryson, 2006). The TTF model is shown in Figure 2 below.

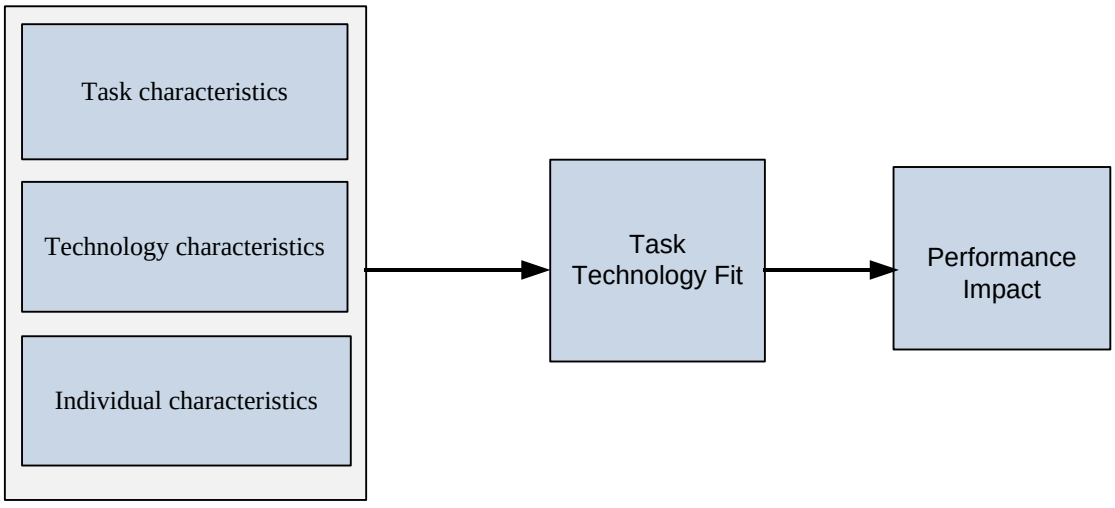


Figure 2. The Model of Task-Technology Fit (Goodhue, 1995).

DeLone and McLean Model (1992–2008)

A model introduced by DeLone and McLean (1992) includes six major categories of IS success: SQ, IQ, use, users' satisfaction, II, and organizational impact (Figure 3). This

model was used to explain why system users accept or reject information technologies. Abugabah et al. (2009) noted that this model focuses on factors that lead to users' satisfaction, while ignoring technology and task factors. Intention to Use/Use is assumed to be the leading indicator of the success of ERP system usage in this research. Its direct antecedents are PU, PEU, and subjective norm, as described in the previous section.

DeLone and McLean's (1992) success model of IS is one of the most cited and commonly used models in IS literature. In general, the model has been used to explain IS success at the individual level of analysis. The model has also been utilized to measure success at the organizational level of analysis. For the purpose of this study, DeLone and McLean's success model has been used for the dissertation study.

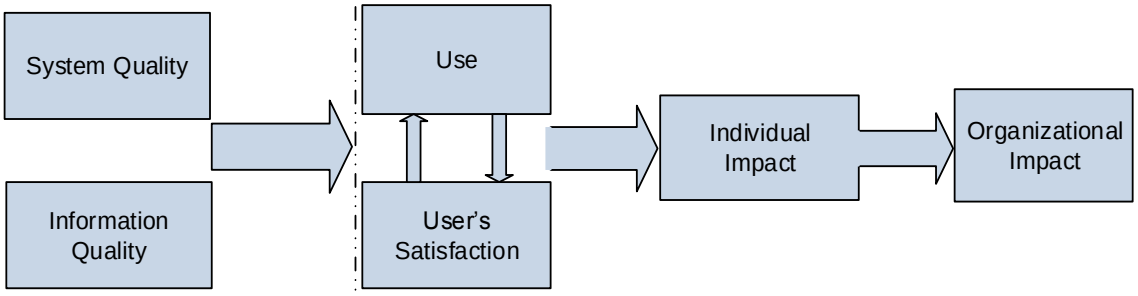


Figure 3. Original D&M Success Model by DeLone and McLean (1992).

The DeLone and McLean (D&M) model (2003) is an updated version of the DeLone and McLean success model (1992), which added "SVQ," and collapsed "Individual Impact" and "Organizational Impact" into "Net Benefits." "SVQ" is included as an important element of IS success given the importance of IS support. SVQ is the quality of support that system users receive from the IS department and IT support personnel, and includes factors such as responsiveness, accuracy, reliability, technical competence, and empathy of the personnel staff (DeLone & McLean, 2003).

Users' satisfaction was defined as the extent to which users believe the IS available to them meets their system requirements. The D&M model specifies the application quality of the system. Both models provide a more comprehensive tool, which can help in evaluating the factors that influence end users in an IS environment. Figure 4 depicts the updated D&M model.

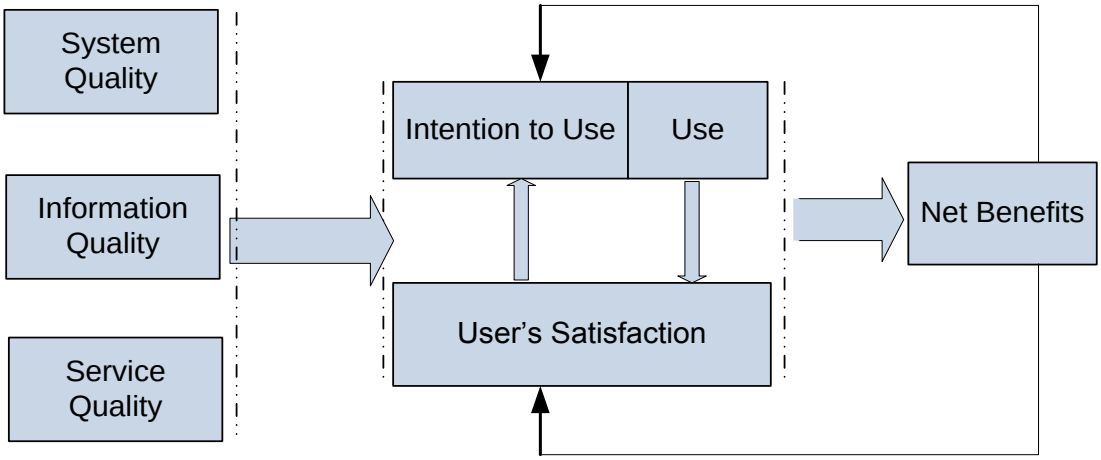


Figure 4. An Updated Success Model by DeLone and McLean (2003).

The latest model includes SVQ as an important dimension of IS success; research suggests that there is a correlation between end users' expectations of SVQ and the productivity level.

Botta-Genoulaz (2005) indicated that users' satisfaction is one evaluation mechanism for determining ERP success. The literature shows that user satisfaction is one of the most-widely used success measures of IS success. It is hypothesized that user satisfaction is associated with use/intention to use, as well as end users' performance. It is believed that an intention to use a particular system is determined by an individual perception toward the system **(**DeLone & McLean, 2003). According to Venkatesh and Davis (2000), end users' satisfaction is usually based on whether or not the technology being used has

relevance to their tasks. II is related to learning, awareness/recall, decision effectiveness, and individual productivity in an ERP environment.

Petter et al. (2008) used the technique of qualitative literature review to dissect 180 papers found in the academic literature dealing with IS success. The authors built their D&M IS success model study upon prior research related to IS success by summarizing the measures applied to the evaluation of IS success and by examining the relationships that encompass the D&M IS success model at the individual and organizational level of success. The authors used the six dimensions of the D&M model (SQ, IQ, SVQ, use, user satisfaction, and net benefits) to summarize the research results. It was concluded that the D&M IS success model was equally relevant at both the individual and organizational level of analysis and provides reasonable support for the majority of relationships within the model. Specifically, the authors found strong support for interrelationships between the D&M success model constructs at the individual level of analysis. Petter et al.'s (2008) success model is shown in Figure 5 below.

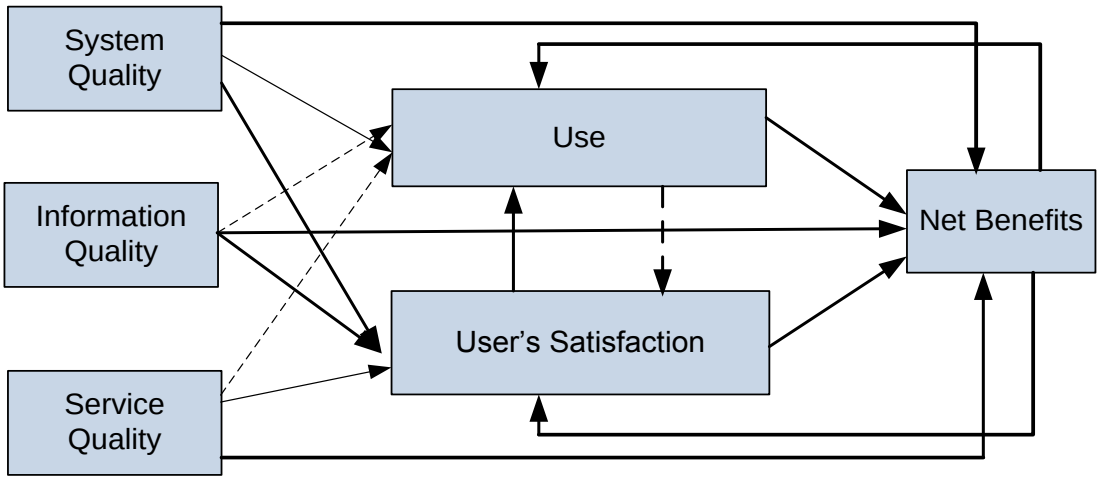


Figure 5. An Updated Success Model by Petter et al. (2008).

Following from the above, this study used a model that includes the SQ, IQ, SVQ, and UCs variables. The research model for this study is based on Petter et al.'s (2008) research model**.** This study examined the model for ERP success at the individual level of analysis. The research study model is shown in Figure 6 below.

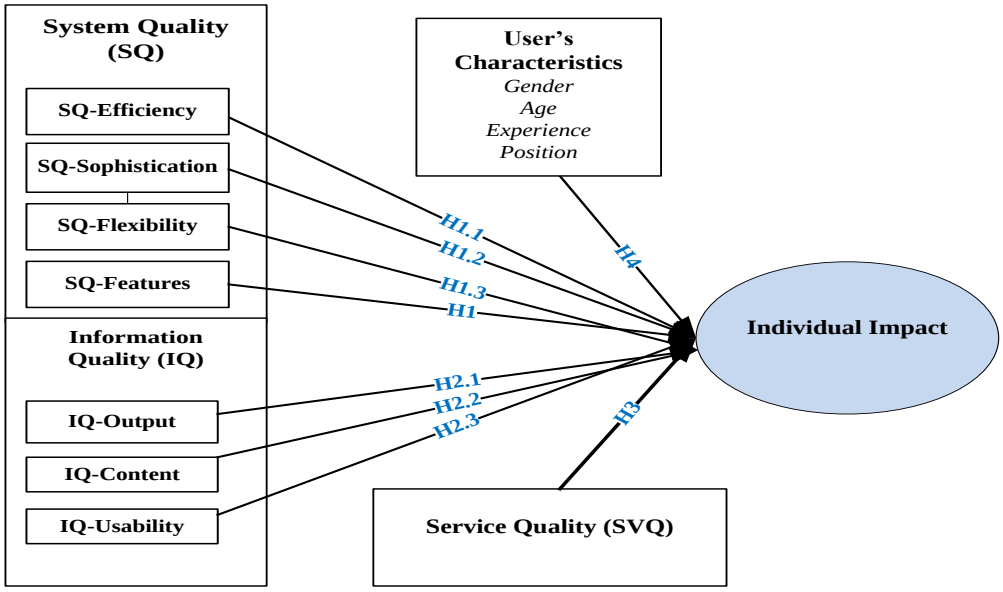


Figure 6. An ERP Success Model at the Individual Level of Analysis.

Present Research Variables

SQ is concerned with data accuracy, data currency, ease of use, ease of learning access, system features, system accuracy, flexibility, reliability, efficiency, sophistication, integration, and customization of the system (Petter et al., 2008).

IQ is concerned with availability, relevance, accuracy, conciseness, completeness, understandability, currency, timeliness, and usability (Petter et al., 2008).

SVQ is concerned with responsiveness, accuracy, reliability, and training of the ERP system. DeLone and McLean (2003) defined SVQ as "the quality of the support that

systems users receive from the IS department and IT support personnel." The authors included SVQ to measure users' expectations and their perceptions of the system.

UCs concern age, gender, education, experience, and position of the individuals. According to a study conducted by Zviran, Pliskin, and Levin (2005), there is a relationship between age and user satisfaction. Older people are more likely to fear new technology. Users with more education are more eager to use IS more often and have greater IT satisfaction (Holsapple et al., 2005). Zviran et al. (2005) indicated that there is a relationship between IS experience and user satisfaction, experienced users tend to be more effective than inexperienced users with IS technology.

According to Abugabah et al. (2009), further research should try to investigate details of UCs and other factors. The authors noted that investigating user needs and expectations of a particular application may help in fixing any gaps between task requirements, user needs, and system impacts. In short, while previous research has identified the relationship between users and IS, more research effort is required to explain aspects in the field using UCs such as age, education, experience, and gender. UCs have been added to the research model as one of the main constructs.

Culture and Information System Success

Over the past few years, there has been an increase in attention to IS research literature and the impact of cultural differences on IS users. Researchers in this area have investigated the ERP systems with regard to cultural influences and found that cultural differences are crucial to ERP success.

The literature in the field of IS clearly indicates that culture is an important factor for the success or failure of IS projects. Talet and Alwahaishi (2011) asserted that an IS implemented successfully in one culture may be a failure in another. Therefore, adopting an IS that has been developed in one culture involves more than just providing information on the technical aspects of the system. The authors further reported that the most frequent reason given for the failure of IS was the neglect of cultural factors.

Many different cultural dimensions have been identified over the years. One of the most significant authors is Hofstede, who described four cultural dimensions: power distance, uncertainty avoidance, individualism/collectivism, and masculinity/femininity (Bass, 1990). Power distance describes the degree to which a society accepts inequality in the distribution of power within that society. Uncertainty avoidance is the degree to which a culture feels comfortable in unstructured situations. Individualism/collectivism details the degree to which individuals in a culture define themselves as individuals or according to their place within the group. Masculinity/feminism is the degree to which a culture demonstrates characteristics considered to be masculine, for example valuing achievement, or feminine, for example valuing relationships (Hofstede, 1993).

The existence of cultural differences across nations has been extensively documented (Hofstede, 2001). These studies assessed the perceptions of values, ethics, and management across different cultures (Hofstede & Bond, 1988). Hofstede longitudinally examined 53 nations to identify differences in management.

Although Hofstede's national culture framework has been criticized, Leidner and Kayworth (2006) found that over 60 percent of studies used one or more of Hofstede's cultural dimensions. According to McCoy, Galletta, and King (2007), most researchers,

including those who disagree with his dimensions on national culture utilize Hofstede's measures and concepts. Hofstede (1980) tested the cultural factors with 116,000 employees from 40 nations, however, only the service and sales employees of IBM were included in the study. In 1991, Hofstede extended his original study and included data for an additional ten countries in three different regions: the Middle East, West Africa, and East Africa. Hofstede (2001) concluded that national culture and its values affect the work environment and its management.

According to Hofheinz (2005), religion plays a significant role in determining the different aspects of social and traditional life. For example, the Arab world is considered one of the most difficult cultural systems in the world, very different from western countries. Religion is also considered as one of the main determinants of IT usage in these countries. The author illustrates a comparison between the Arab world and the United States in terms of the index values of Hofstede's cultural dimensions. While the Arab culture is high in power distance and uncertainty avoidance, the American culture is high in individualism and masculinity.

Leidner and Kayworth (2006) underscored the importance of culture and how it is linked to the success of IS. Erumban and Jong (2006) pointed out that cultural factors influence the implementation of new technologies across countries. The authors concluded that Arab countries with high scores in UA and PD have a lower rate of IS implementation success than countries with low UA and PD scores. Leidner and Kayworth (2006) stated that UA plays a significant role in determining how groups will potentially accept or reject an IS. Following from literature on the importance of cultural differences, this research assesses whether the relative importance of the research study factors to end users differ

between the Middle East and the research results found in Petter et al.'s (2008) summarized research, which was conducted in more developed regions.

It has been noted that the Middle East has been undertaking reforms aimed at improving services and IT infrastructure (Rabaa'i, 2009). For example, over the past four decades, the U.A.E. has undergone an impressive transformation from a small desert economy to an open market economy with a high per capita income and a huge trade surplus. Another example, Jordan, has been working on advancing itself in technology. Both countries have successfully kept pace with technological developments in the world (Janardhan, 2011).

End User Definition

According to Kujala, Kauppinen, Lehtola, and Kojo (2005), users should be considered during the life cycle of an ERP project. According to Dery, Hall, and Wailes (2006), an end user can be defined as "anyone who is reliant on the ERP software in some operational sense" (p. 200). For the purposes of this study, an end user is an employee of an organization who is currently using an ERP system, or has used it in the past.

Success in the Context of this Research

The ERP systems project presents issues related to the different perceptions of success. The success of ERP systems is unclear and a subjective concept (Zhang, Lee, & Zhang, 2002; Monk & Wagner, 2008). In the context of this research, end users play a substantial role in the success of IS. Understanding their requirements is essential for ERP success.

Based on the literature discussed in this paper, this research supports the important role that end users play in achieving ERP success.

Summary

Chapter 2 provided a general overview of the theoretical background to the evaluation of the ERP success at the individual level of analysis. Despite the fact that many methods were used to evaluate the success of ERP systems, they lack an emphasis on end users' productivity. A review of the ERP literature revealed that many ERP success studies investigated the success factors that promote ERP success, yet, there are many negative reports on ERP systems' success. To provide a better understanding of ERP success at the individual level of analysis, this research explored the factors that influence ERP users in an ERP environment in the Middle East. An understanding of the factors that influence end users in an ERP environment is essential for ERP success. The existence of cultural differences across nations has been extensively documented and noted in this chapter. The shortage of research on the evaluation of IS success at the individual level in the Middle East was made evident. The chapter pointed out the need for this type of research in different regions, including the Middle East. This chapter also discussed the available literature on IS success models. Literature reviews and critical analysis of previous work in this field were also noted in this chapter.

Chapter 3

Methodology

Overview of Research Methodology

Introduction

This study investigated the relative importance of SVQ, IQ, and SQ to ERP users in the Middle East. The adoption of a quantitative method was the most useful approach for evaluating the relative importance of the research variables at the individual level of analysis. According to Amaratunga and Baldry (2002), quantitative research can evaluate and explain human behaviors in different research settings. Researchers conducting quantitative analysis use statistical tools to investigate causal relationships and test hypotheses. Patton (2002) defines quantitative research as a systematic attempt to define, measure, and report the relationships between various factors and produce numerical data that can be statistically analyzed. This study utilized a quantitative approach to understand the factors that contribute to ERP success at the individual level of analysis. Data were collected through the use of a web-based survey. The survey used a Likert scale to measure ERP users' perceptions of SQ, IQ, SVQ, and II along with the UCs factors.

The three main goals of this research were:

1. The first goal was to understand the factors that contribute to ERP success at the individual level of analysis in an ERP environment in the Middle East.

2. The second goal was to determine whether the relative importance of the IS factors differs between the research results in this study and the research results found in Petter et al.'s (2008) summarized research.

3. The third goal was to determine whether UCs (age, gender, experience, and position) moderate the relationships between SQ, IQ, and SVQ and the II variable. The effect is examined using the MGA method (Henseler et al., 2009).

Specific Research Method

The specific research approach used in this study is a quantitative approach, which includes using numerical methods and statistical tools for collecting and analyzing data. The dissertation study collected the necessary data from ERP users to answer the research questions and test the research hypotheses. Information available from previous research was analyzed and used to understand the subject matter better. The survey instrument was developed from questionnaires widely used in the previous literature (Gable, Sedera, & Chan, 2008; Petter et al., 2008).

Factor analysis was employed to investigate the ability of a predefined factor model to fit an observed set of data. It was also used to establish the validity of each individual factor separately. EFA via principal component analysis (PCA) was used to discover the critical factors of SQ, IQ, SVQ, and UCs that influence ERP users. PLS-based structural equation modeling (SEM) was used to validate the instruments based on confirmatory factor analysis (CFA) and to test the research hypotheses. This study is designed to discover the items in SQ, IQ, and SVQ necessary to bring positive impacts to ERP users. The statistical analysis tool Statistical Package for Social Sciences (SPSS) was used for EFA

analysis. SmartPLS 3.0 (beta) was used for SEM, CFA, and partial least squares (PLS) analysis (Ringle, Sarstedt, & Schlittgen, 2014). The data analysis section provides more details on the specific research method used.

Instrument Development and Validation

Survey Instrument

According to Creswell (2009), survey research can determine attitudes and opinions of a sample population. Evans and Mathur (2005) noted that an online survey has many advantages, such as reaching participants around the globe, flexibility, low cost, and timeliness for data collection and analysis. This research study uses a survey tool to collect data from ERP users for further analysis. The survey was developed using SurveyMonkey® software and was delivered as an online survey. The link to the survey was sent to ERP users in the Middle East. Pinsonneault and Kremer (1993) stated that conducting a survey is one of the most common research methodologies used in IS research. Lazar (2006) noted that performing a survey involves the use of questionnaire instruments.

Questionnaire Design

Preece, Rogers, and Sharp (2002) noted that questionnaires are used to collect demographic data and users' opinions. Questionnaires are used to gather data from people. Questionnaires can consist of both closed and open questions. Open questions are those where answers are given freely, whereas closed questions require participants to select an answer from a choice of options provided. When measuring attitudes using a Likert scale, respondents can place their attitude toward a statement on a scale from strong agreement

to strong disagreement. Empirical studies have shown that five-point scales provide validity and reliability in research (Dawes, 2008). The Likert-scale option was selected for the online survey.

The questionnaires for the online survey were developed to determine the key factors that contribute to the II factor in an ERP environment. The questionnaires were designed to take no longer than 10 minutes to complete. The researcher carefully developed the survey items for this study based on the construct definitions available in the literature and previously used questionnaires (DeLone, & McLean, 2003; Gable, Sedera, & Chan, 2004; Petter et al., 2008). The items used in the survey are noted in the next four sections.

Section one covers the demographic data about the respondents. The goal of this section was to collect data about end users in an ERP environment. The demographic section included gender, age, position, experience, and education.

Section two covers the SQ variables in relation to the II variable. SQ describes the desirable characteristics of the system: these include accuracy, currency, ease of use, ease of learning, access, system features, system accuracy, flexibility, reliability, efficiency, sophistication, integration, and customization (DeLone & McLean, 2003; Gable et al., 2003; Sedera et al., 2003; Petter et al., 2008). SQ includes 14 survey items. The intention was to discover the items in SQ that contribute to the II variable in the research model.

Section three covers the IQ variables in relation to the II factor: these variables include relevance, availability, conciseness, completeness, understandability, currency, timeliness, and usability (Gable et al., 2008; Petter et al., 2008). IQ includes 10 survey questions. The intention was to discover the items in IQ that contribute to the II variable in the research model.

Section four covers the SVQ variable as it relates to IQ, SQ, and II. SVQ is the quality of the support that system users receive from the IS department and IT support personnel, and includes factors such as responsiveness, accuracy, reliability, technical competence, and empathy of the personnel staff (Petter et al., 2008). The SVQ variable includes five survey items for testing the relationship between SVQ variables, and the II variable. The research study variables SQ, IQ, and SVQ were tested for their relative importance to end users.

Target Participants

Before carrying out the large-scale survey, questionnaires were prepared, reviewed, and pilot-tested with a small sample of users. The target group of the survey included existing end users who are currently using ERP systems and former ERP users. Participants were contacted and asked if they are willing to participate. The respondents of the survey were selected from different functional areas, such as finance, human resources, sales, and IT departments. The researcher identified participants from referrals, social network sites, and other network groups. Invitations were sent to prospective participants based on their published professional profiles.

Following from the pilot study findings, the instrument was revised based on content validity and reliability of the measures.

The main survey was sent to over 700 users from public and private organizations in the Middle East. According to Fowler (2009), the typical response rate for online surveys ranges from 30% to 60%. The author further stated that “a sample of 150 people will describe a population of 15,000 or 15 million with virtually the same degree of accuracy” (p. 44). Mertler and Charles (2011) cautioned that the response rate is “always a concern”

when surveys or questionnaires are administered (p. 114). The researcher acquired the perceptions of as many members of the accessible population as possible to collect sufficient data.

The contacts were gained through a variety of means, including appealing to ERP vendors to contribute to an academic research project, and by working with ERP user groups to get the survey distributed to their user bases. As previously mentioned, a link to the survey was sent to ERP users in the Middle East. The respondents were selected from network groups related to ERP systems practices on LinkedIn and other social media sites (ERP forums, Google Groups, and Yahoo Groups). To maximize the number of participants, the researcher used participants from referrals, social network sites, and other network groups based on their published professional profiles.

Ethical Considerations

Permission to conduct this study was obtained from the Institutional Review Board (IRB) at Nova Southeastern University. According to Creswell (2009), IRBs are formed to support the regulations that protect the rights of survey participants. Following the ethical considerations for a dissertation study, the researcher followed the IRB standards for collecting data. The survey link provided the following information to all participants:

1. Purpose of the dissertation research.
2. No request for sensitive or confidential information.
3. Participation in this survey is completely voluntary.
4. Estimated time to complete this survey.
5. Researcher name and email.

6. School name and email.

Participation in this survey was strictly voluntary. All participants were informed about the nature of the study, the extent of dangers, if any, and any obligations related to the study. In addition, all participants were guaranteed confidentiality and anonymity.

Pilot Survey

A pilot survey has the purpose of examining the integrity of the survey items being developed for this research. A pilot study improves data collection, helps to develop relevant survey questions, and provides some conceptual clarification of the research. Pilot surveys ensure that the proposed methods will work before being used in the actual survey. Pilot studies provide an opportunity to make adjustments and revisions prior to use in a large study (Yin, 2009).

The contents of the main survey were revised based on the data analysis of the pilot survey. To maximize the content validity of the instrument, the dissertation study followed the guidelines of Straub, Boudreau, and Gefen (2004) in the development of the survey questionnaires. The survey items were carefully developed by the researcher based on the construct definitions available in the literature and the research by Petter et al. (2008) and Gable et al. (2008).

According to Baker (1994), a sample size of 10% of the actual study sample size is sufficient for the pilot study. For the purpose of this study, 20 to 30 participants were sufficient to examine the integrity and reliability of the survey items.

Pilot Survey Reliability Analysis

Based on quantitative methodology, the pilot survey instrument was developed from questionnaires widely used in prior studies. The research instrument evaluated the reliability coefficient known as Cronbach's alpha. The reliability of each construct was determined through the use of IBM's SPSS software. Construct reliability showing a Cronbach alpha coefficient greater than .5 was considered reliable. According to Rovai, Baker, and Ponton (2013), factor loadings greater than .6 are more than satisfactory, while factor loadings less than .4 are considered low.

Most questions in the survey were adapted from the relevant previous research related to IS success factors (Gable et al., 2008; Petter et al., 2008). All items were measured on a five-point Likert scale ranging from "strongly disagree" to "strongly agree." The variables and questions listed in the tables below were used in the survey instrument.

Table 1 below shows the survey items for the UCs variable. The online survey was developed to determine the key factors that contribute to ERP success at the individual level. The demographic portion was designed to extract data from the respondents regarding their gender, age, position, experience, and education.

Table 1. Demographic Information.

Gender	1. Female 2. Male
Age	1. 20–29 2. 30–39 3. ≥40
Position	1. Regular Employee 2. Management 3. Senior Management
Experience	1. 1–3 Years 2. 4–10 Years 3. >10 Years

Education	1. Associate Degree 2. Bachelor's Degree 3. Graduate Degree

Table 2 below shows survey items for the SQ variables. The online survey was developed to determine the SQ key factors that contribute to ERP success at the individual level (Gable et al., 2008; Petter et al., 2008).

Table 2. System Quality Items (Gable et al., 2008).

System Quality	
1. Data accuracy 2. Data currency 3. Ease of use 4. Ease of learning 5. Access 6. User requirements 7. System features 8. System accuracy 9. Flexibility 10. Reliability 11. Efficiency 12. Sophistication 13. Integration 14. Customization	1. Data from the ERP often needs correction 2. Data from the ERP is current enough 3. The ERP is easy to use 4. The ERP is easy to learn 5. It is often difficult to get access to information that is in the ERP 6. The ERP meets my requirements 7. The ERP includes necessary features and functions 8. The ERP always does what it should 9. The ERP user interface can be easily adapted to one's personal approach 10. The ERP system is always up and running as necessary 11. The ERP system responds quickly enough 12. The ERP requires only the minimum number of fields and screens to achieve a task 13. All data within the ERP are fully integrated and consistent 14. The ERP can be easily modified, corrected, or improved.

Table 3 below shows survey items for the IQ variables. The online survey was developed to determine the IQ key factors that contribute to ERP success at the individual level (Gable et al., 2003, 2008). The IQ variables included 10 survey items for testing the relationship between IQ variables and the II variable.

Table 3. Information Quality Items (Gable et al., 2008).

Information Quality	
1. Importance	1. Information available from the ERP system is important.
2. Availability	2. Information from the ERP system is always available.
3. Understandability	3. Information from the ERP system is easy to understand.
4. Timeliness	4. Information from the ERP system is always timely.
5. Relevance	5. The information provided by the ERP system is relevant.
6. Format	6. Information from the ERP system appears readable, clear, and well formatted.
7. Conciseness	7. Information from the ERP system is concise.
8. Uniqueness	8. Information from the ERP system is unavailable elsewhere.
9. Content	9. Information from the ERP system is in a form that is readily usable.
10. Accuracy	10. Though data from the ERP system may be accurate, outputs sometimes are not.

Table 4 below shows the survey items for the SVQ latent variable. The online survey was developed to determine the SVQ key factors that contribute to the ERP success at the individual level. SVQ is the quality of the support that system users receive from the IS department and IT support personnel (Petter et al., 2008). The SVQ variable used five survey questions for testing the relationship between the SVQ and II variables.

Table 4. Service Quality Items (Petter et al., 2008).

Service Quality	
1. Responsiveness	1. I receive prompt service from the IS department
2. Accuracy	2. The information I receive from the IS department is accurate.
3. Reliability	3. The IS department delivers what they promise to deliver
4. Training	4. Training provided by the ERP department improves my quality of work
5. Tangible	5. The IS department solves my problems

Table 5 below shows the survey items for the II variable. The online survey was developed to determine the II key factors that contribute to the ERP success at the

individual level. The II is the dependent variable and measures ERP success at the individual level of analysis (Petter et al., 2008). The II variable used four survey questions.

Table 5. Individual Impact (Gable et al., 2008).

Individual Impact	
1. Learning	1. I have learned much through the presence of the ERP system.
2. Awareness/Recall	2. The ERP system enhances my awareness and recall of job-related information.
3. Decision effectiveness	3. The ERP system enhances my decision-making effectiveness at the job.
4. Individual productivity	4. The ERP system increases my productivity at the job.

Data Analysis

The research method that follows describes the data analysis for the latent variables. EFA via PCA was used to discover the critical factors of SQ, IQ, SVQ, and II perceived by ERP users. PLS-based SEM was used to validate the instruments based on CFA (Ringle et al., 2014). The constructs used in this study are SQ, IQ, SVQ, UCs, and II. For each construct, the researcher identified the underlying domains of that construct from previous research. This study is designed to discover the items in SQ, IQ, and SVQ necessary to bring positive results to ERP users.

For the purpose of this research study, data analysis was conducted in several phases.

Phase One: Requires understanding of frequencies and percentages of the demographic variables. To have a better view of the respondents, some demographic

questions were added. UCs items were tested to answer research question three and hypothesis four in the research study.

Phase Two: Validates the items using factor analysis to determine whether items in the survey represent a specific construct. The researcher determined the validity of the items through exploratory factor analysis (EFA). EFA is one of the most-widely used applied statistical techniques in social sciences (Costello & Osborne, 2005). Factor loadings and sample size are very important in data analysis. Factor loadings depend on the sample size of the dataset. Many researchers accept loadings that are greater than .5 (Field, 2005). Fowler (2002) suggested that the sample size depends on methods and techniques used for the data analysis. Field (2005) suggested 300 cases for factor analysis. Hair et al. (2006) provided further details on the sample size and stated that a model with five or fewer latent variables can be well-assessed with a small sample size of less than 200.

The researcher determined the validity of the items through EFA using PCA with Varimax rotation. According to Rovai et al. (2013), factor loadings greater than .6 are more than satisfactory, while factor loadings less than .4 are considered low. PCA investigates the interrelationships among variables and reduces the variables to a small number of factors (Rovai et al., 2013). PCA was executed separately on each of the research dimensions (SQ, SVQ, IQ, and II). The next section provides more details on the relationships between the independent and dependent variables.

Phase Three: The hypothesized relationships in the conceptual model of SQ, IQ, SVQ, and UCs as they relate to the II variable were validated using the PLS method, a version of

structured equation modeling (SEM) used in performing CFA. Levy and Green (2009) noted that SEM is a valid technique for analyzing conceptual models.

SEM contains the measurement model and the structural model. The measurement model describes the latent variables in the model, and allocates the observed variables accordingly. A structural model or path analysis investigates the hypothetical relationship among the latent variables (Hair et al., 2006).

The PLS technique was used to finalize the validation of the model. PLS specifies the strengths between dependent and independent variables (Ringle, Sarstedt, & Straub, 2012). The paths from SQ, IQ, SVQ, and UCs to the II variable were tested to show the significance of each path. According to Straub et al. (2004), reliability and construct validity are required for instrument measurement. Convergent validity and discriminant validity are components of construct validity.

Reliability is used to evaluate the internal consistency of a construct. CFA analysis of PLS provides the values for Cronbach's alpha and composite reliability for each construct. The PLS modeling technique was used to validate the constructs of SQ, IQ, and SVQ to test the hypotheses. PLS-MGA was used to test the moderating effects of UCs (age, gender, experience, and position). The research study examines reliability, convergent validity, and discriminant validity for the constructs (Hair, Hult, Ringle, & Sarstedt, 2014).

Convergent Validity

Convergent validity suggests that measured items in a specific construct should share a high proportion of variance (Hair et al., 2006). Factor loadings should be higher than 0.6 for convergent validity. Items not meeting the 0.6 requirement for convergent validity were considered for deletion (Hair et al., 2011).

Composite Reliability

Composite reliability should be higher than 0.7. Items not meeting the 0.7 requirement for composite reliability were considered for removal. According to Singleton and Straits (2010), computing the composite reliability values allows for estimating the reliability of the measures.

Average Variance Extracted

Average variance extracted (AVE) measures the amount of variance that a given variable gets from its items (Fornell & Larcker, 1981). AVE should be higher than 0.5. Items not meeting the 0.5 requirement for AVE should be considered for deletion (Hair et al., 2011; Wong, 2013).

Discriminant Validity

Discriminant validity was conducted to test whether all of the constructs are different from each other. To measure discriminant validity, the researcher used the Fornell and Larcker (1981) criterion in SmartPLS. The Fornell–Larcker criterion states that discriminant validity occurs if the square root of the AVE for each latent variable is higher than the correlations among all latent variables (Hair et al., 2011; Wong, 2013).

Reliability Analysis

Reliability refers to the consistency of each item's measurement of the principal construct (Salkind, 2009). The reliability of each construct was determined through the use of SPSS statistical software and SmartPLS software. The research model included four main constructs that were expected to impact the II variable. Consistency within the research instrument was evaluated by determining the reliability coefficient known as Cronbach's alpha. Rovai et al. (2013) indicated that a Cronbach's alpha coefficient of .70

to less than .90 indicates high reliability, and .50 to less than .70 indicates sufficient reliability. Observed factors that are .5 and higher were extracted from the latent variables to show their relative importance.

Structural Model Assessment

Multicollinearity

Multicollinearity is concerned with the research variables being highly correlated (Wong, 2013). A higher level of multicollinearity affects the variance explained by each variable (Hair et al., 2006; Field, 2006). Tabachnick and Fidell (2007) recommended two common techniques to test for multicollinearity; the first is variance inflation factors and the second is tolerance level. A variance inflation factor (VIF) greater than 5 is usually considered problematic in multicollinearity. VIF is the inverse of tolerance effect (Pallant, 2007). The tolerance level explains the variability in explaining the variance for a given variable. The collected data were examined and screened for multicollinearity issues.

According to Hair et al. (2014), assessing the structural model in PLS-SEM requires the following four steps: (1) assessing the significance of the path coefficients, (2) assessing the R^2 values, (3) assessing the effect size (f^2), and (4) assessing the prediction relevance (q^2). This research followed the four steps suggested by Hair et al. (2014) for assessing the research model.

Comparison with Previous Studies

To assess whether there are differences in findings between this dissertation study and the summarized research study by Petter et al. (2008), the findings from the two studies

were compared and explained. The findings of the research by Petter et al. (2008) are indicated in Table 6 below.

Table 6. Petter et al.'s (2008) Summarized Research Results.

Constructs Relationship	**Petter et al.'s (2008) Research Outcome**
System Quality (SQ) → Individual Impact	Moderate to Strong Support
Information Quality (IQ) → Individual Impact	Moderate to Strong Support
Service Quality (SVQ) → Individual Impact	Moderate to Strong Support
Users' characteristics (UCs) → Individual Impact	No Data Found

Subsequently, the researcher draws a conclusion on the research hypotheses and provides answers to the research questions.

Users' Characteristics Moderation Effect

The moderating effects of gender, age, position, and experience on the strength of a relationship between the independent variables and the dependent variable were tested using SmartPLS's MGA technique (Henseler, 2012). The PLS-MGA analysis allows researchers to test if two groups have significant differences in their parameter estimates (e.g., outer weights, outer loadings, and path coefficients). The result is statistically significant if the *p* value is less than 0.05 or greater than 0.95 (Henseler et al., 2009).

Format for Presenting Results

The results from the online survey were exported into a special format for further analysis with the SPSS and SmartPLS statistical software. The findings are presented in

various tables, figures, charts, and graphs to enhance readability and visual clarity of all findings. Supporting details of statistical analyses are presented in appendices. Tables were generated to explain the following main points:

1. Data gathered from the pilot study.
2. Data gathered from the actual study.
3. Demographic characteristics of the participants.
4. Validity statistics, as determined through PCA.
5. Reliability, as determined through Cronbach's alpha coefficient.
6. PLS-based SEM for validating the instruments based on CFA.
7. Comparison with previous studies.

Resource Requirements

For this study to be successful, it requires communication with employees from different organizations who are currently using ERP systems. The communication requires the use of emails and online surveys software. SurveyMonkey online services were used to create and administer the data collection process. Other software, such as IBM's SPSS, was used for statistical analysis. SmartPLS 3.0 was utilized for SEM, CFA, and PLS analysis. Hardware, software, and networks necessary to complete this study were made available to the researcher. Approval to conduct the dissertation study was obtained from the IRB at Nova Southeastern University.

Summary

This chapter presented the quantitative research methodology, the survey approach used in this study, and the reason for its use. This research developed a structural model to predict ERP success at the individual level of analysis in the Middle East. In this chapter, the research design and description of the survey instruments were presented. As part of the first phase for collecting data, a pilot survey was used before conducting the actual survey. EFA was used to identify the importance of the items within the four main variables used in this dissertation study. Cronbach's alpha was used to determine the reliability of each variable. PCA was used as an extraction method. Following the EFA results, the researcher investigated the items' reliability, internal consistency, convergent validity, and discriminant validity. Hypothetical relationships were examined using SEM based on the PLS method. The moderating effects of gender, age, position, and experience between SQ, IQ, SVQ, and II were tested using PLS-MGA. This section also provided the steps needed to assess the research structural model. The researcher also noted the format for presenting the research results and the resource requirements needed to complete the present research.

Chapter 4
Results

Introduction

The previous chapter identified the appropriate research methodology to conduct this study. This chapter deals with the statistical analysis required to answer the research questions and test the research hypotheses. Following from the survey instrument, this section presents the screening and treatment process of the research data. It presents the descriptive statistics of the research participants. The next section presents the data analysis using PLS and presents the reliability and validity of the instrument. To confirm the items within constructs, the researcher performed EFA on the research items. The SEM technique was used to analyze the research model through CFA. The MGA process was used to analyze the moderating effects of UCs.

The following sections provide the data analysis and results of the investigation. The results are explained using tables and figures for illustrations.

The goal of this research was to understand the factors that contribute to ERP success at the individual level of analysis and to determine whether the relative importance of the IS variables differs between the research results in this study and the research results found in Petter et al.'s (2008) summarized research. In addition, this research explored the moderating effect of a relationship between the independent variables and the dependent variable. The effect was examined using the PLS-MGA method (Henseler et al., 2009).

The research model posited that the independent variables SQ, IQ, SVQ, and UCs are the variables that affect and moderate the dependent variable II. This study investigated the following four primary research questions:

Research Question One: What are the critical factors for SQ, IQ, SVQ, and II?

Research Question Two: Which of the latent variables SQ, IQ, and SVQ have the highest level of importance to the II variable?

Research Question Three: Is there any moderating effect of UCs on the strength of a relationship between the independent variables and the dependent variable?

Research Question Four: Do the findings of this research differ from the findings of Petter et al.'s (2008) research results?

The following were the research hypotheses for the dissertation study:

H1: *There is a positive relationship between the SQ variable and the II variable.*

H2: *There is a positive relationship between the IQ variable and the II variable.*

H3: *There is a positive relationship between the SVQ variable and the II variable.*

H4: *There is a moderating effect of UCs on the relationship between the independent variables and the dependent variable.*

Pilot Survey Analysis

A number of ERP users from private and public sectors across the Middle East participated in this research. After securing IRB approval, an invitation was sent to ERP users in the Middle East requesting them to participate in the survey and to forward the survey to people in the workplace. The survey instrument cover page explained the purpose of the study and outlined participants' rights and privacy.

The pilot online survey questionnaire invitation was sent on November 24, 2015, and responses were collected until November 28, 2015. The survey questionnaire was analyzed for functional issues, and tested for validity and reliability. The pilot survey questionnaire was distributed to 50 participants from the Middle East. The researcher sent an invitation using SurveyMonkey™ online clarifying the purpose of the survey. The response rate for the online survey was 68% (34), with 27 participants' providing usable responses. The screening process did not show any major functional issues with the survey.

Reliability Analysis

The reliability of all items was identified using Cronbach's alpha. The reliability analysis indicated a Cronbach's alpha greater than .8. According to Rovai et al. (2013), a Cronbach's alpha of .90 indicates high reliability, .70 to <.90 indicates high reliability, and .50 to <.70 indicates moderate reliability. Table 7 below shows the Cronbach alpha values for all latent variables.

Table 7. Reliability Statistics.

Constructs	**Cronbach's Alpha**	**Cronbach's Alpha Based on Standardized Items**	***N***
System Quality	.850	.857	10
Information Quality	.852	.864	10
Service Quality	.822	.832	5
Individual Impact	.809	.836	4

Note. *N* = Number of items in each construct

Exploratory Factor Analysis

Following the reliability analysis, the researcher conducted EFA via PCA to discover the critical factors of SQ, IQ, and SVQ perceived by ERP users in the Middle East.

As a result of the EFA analysis, 29 items were retained for further analysis. The items were distributed according to the EFA analysis. SQ factors retained 10 items on three components. IQ factors retained 10 items on three components. SVQ retained five items on one component. II retained four items on one component. Following from the initial PCA extraction method, the researcher proceeded with the data for further analysis.

Although the survey items were validated in previous research, the researcher reconfirmed the validation through convergent and discriminant validity.

Convergent Validity

The researcher ascertained the convergent validity through the computed AVE in SmartPLS. The AVE was higher than the 0.5 threshold and fulfilled the criterion of convergent validity (Fornell & Larcker, 1981). Items not meeting the 0.5 requirement for AVE were considered for deletion (Hair et al., 2011; Wong, 2013). The analysis for the convergent validity result indicated that the AVE for each latent variable was greater than 0.5. As a result, this confirms the convergent validity of the research items.

Discriminant Validity

To measure discriminant validity, the researcher used the Fornell and Larcker (1981) criterion in SmartPLS. Discriminant validity is established if the square root of the AVE for each latent variable is higher than the correlations among the latent variables (Hair et al., 2011; Wong, 2013). The discriminant validity was established because the square root of the AVE for each latent variable was greater than the correlations among the latent variables. The research method that follows describes construct measurement for the validated constructs. EFA via PCA was used to discover the important factors for SQ, IQ,

and SVQ. PLS-based SEM was used to validate the instruments based on CFA and path coefficients.

Main Survey

Data Collection

Following from the pilot study analysis, the quantitative process began with the development of a survey instrument to collect data for the main study. The main survey instrument was distributed to ERP users in the Middle East. The links to the online survey were sent to over 700 users in the Middle East. The target users were from a variety of ERP public and private organizations in the Middle East. The main survey questionnaire invitation was sent on December 4th, 2015, and responses were collected until January 12, 2016. Out of the 700 potential participants, 260 responses were collected, giving a 37.8% response rate. From the 260 participants, only 218 participants provided usable responses.

Data Screening

Survey responses were screened for missing data and outliers. The survey was organized to allow a single answer for each question and required a response to all survey items. The total number of responses was 260. The analysis revealed that there were several incomplete cases and missing values. To explain the incomplete cases, a missing value analysis procedure was conducted using SPSS. After performing a missing value analysis in SPSS 23, the result of the expectation maximization technique revealed that Little's MCAR test was not significant at each item level. The nonsignificant result of Little's MCAR indicates that patterns of missing values were completely at random (Tabachnick & Fidell, 2007). The assumption that the missing data were not at random was rejected.

The researcher accepted the alternate hypothesis that the missing data were random. In addition, the threat was eliminated through the use of the Mahalanobis distance analysis, which was used to identify multivariate outliers. The normality of the data was also checked for all variables. Based on the analysis of skewness and kurtosis values, it was found that the data were within the acceptable range recommended by Hair et al. (2006).

Data Analysis

Descriptive Demographic Analysis

Following from the screening of data, of the 218 responses retained for analysis, 135 items were completed by men and 83 were completed by women. Analysis of the ages of respondents showed that 117 were under the age of 30 and 101 above the age of 30. The analysis of position showed that 120 were regular employees and 98 were supervisors or managers. The analysis of experience indicated that 114 participants had three years' or less experience, and 104 had more than three years' experience. The analysis of education showed that most of the respondents hold a bachelor's degree. Table 8 below shows the demographic information prior to the prescreening process.

Table 8. Descriptive Statistics Demographic Information.

Items	Frequency	Percentage
Gender		
Female	93	35.27%
Male	167	64.73%
Age		
20 to 29	130	50.19%
30 to 39	91	35.14%
≥40	38	14.67%
Experience		
1 to 3	129	49.81%
4 to 10	97	37.45%
≥10	33	12.74%
Position		
General Employee	137	52.90%
Middle Management	82	31.66%
Senior Management	40	15.44%

Education		
Associate Degree	33	12.74%
Bachelor's Degree	163	62.93%
Graduate Degree	63	24.32%

Reliability Analysis

The reliability for all items was tested using Cronbach's alpha coefficient. The reliability analysis indicated a Cronbach's alpha >.8. According to Rovai et al. (2013), a Cronbach's alpha of .70 to <.90 indicates high reliability, and .50 to <.70 indicates moderate reliability. The result of the reliability analysis shows that all items are within the acceptable range for reliability. Table 9 below shows the reliability statistics for the latent variables.

Table 9. Reliability Statistics–Main Study.

Constructs	**Cronbach's Alpha**	**Cronbach's Alpha Based on Standardized Items**	***N***
System Quality	.781	.781	14
Information Quality	.779	.780	10
Service Quality	.695	.695	5
Individual Impact	.745	.744	4

Note. *N* = Number of items in each construct

Exploratory Factor Analysis via Principal Component Analysis

Before performing the EFA, the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was checked. A KMO value of greater than 0.6 is statistically significant and is suitable for EFA to provide accurate common variance among items (Tabachnick & Fidell, 2007). The SPSS KMO result ranged from .757 to 0.808. Bartlett's test result was suitable and statistically significant at $p < 0.005$ for EFA.

The study used the EFA technique to extract the important items in the SQ, IQ, SVQ, and II variables. The researcher determined the validity of the items through EFA using PCA with Varimax rotation. According to Rovai et al. (2013), factor loadings greater than .6 are more than satisfactory, while factor loadings less than .4 are considered low. PCA investigates interrelationships among variables and reduces the variables to a small number of factors (Rovai et al., 2013).

Performing a Varimax rotation with an extraction based on eigenvalues greater than 1.0 resulted in retaining the items shown in Table 10 below. The result of the PCA factor analysis suggested that four factors for SQ with a cumulative variance of 59% should be retained. The scree plot in Figure 7 below confirmed that SQ factors should be loaded on four components.

Table 10. SQ-Total Variance Explained.

	Initial Eigenvalues			**Extraction Sums of Squares Loadings**		
Component	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	3.503	29.188	29.188	3.503	29.188	29.188
2	1.482	12.350	41.538	1.482	12.350	41.538
3	1.064	8.868	50.406	1.064	8.868	50.406
4	1.029	8.576	**58.983**	1.029	8.576	58.983
5	.883	7.360	66.342			
6	.768	6.396	72.738			
7	.659	5.493	78.231			
8	.635	5.292	83.524			
9	.555	4.622	88.146			
10	.544	4.531	92.677			
11	.473	3.938	96.615			
12	.406	3.385	100.000			

Extraction Method: Principal Component Analysis.

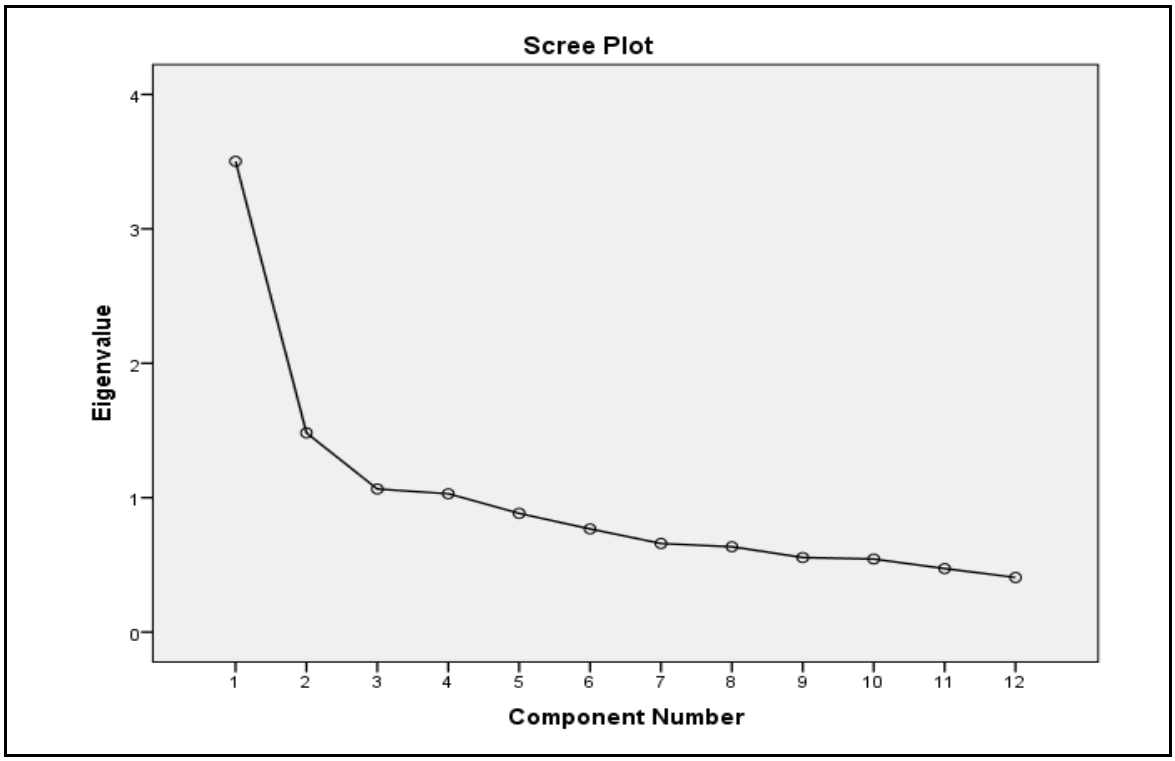


Figure 7. SQ Scree Plot Analysis.

The results of the PCA factor analysis suggested that three factors for IQ with a cumulative variance of 56% should be retained. It was determined that the loading of IQ factors on the three components provides the best loading of items. Following from the analysis provided by both the scree plot and the total variance explained, it was determined that the appropriate number of IQ factors is three. Table 11 below shows the cumulative variance for the three components. The scree plot in Figure 8 below confirms that IQ factors should be loaded on three components.

Table 11. IQ-Total Variance Explained.

	Initial Eigenvalues			Extraction Sums of Squares Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.453	34.535	34.535	3.453	34.535	34.535
2	1.249	12.486	47.021	1.249	12.486	47.021
3	.922	9.224	**56.245**			
4	.838	8.380	64.625			
5	.751	7.513	72.138			
6	.704	7.042	79.180			
7	.630	6.301	85.482			
8	.556	5.556	91.038			
9	.503	5.034	96.072			
10	.393	3.928	100.000			

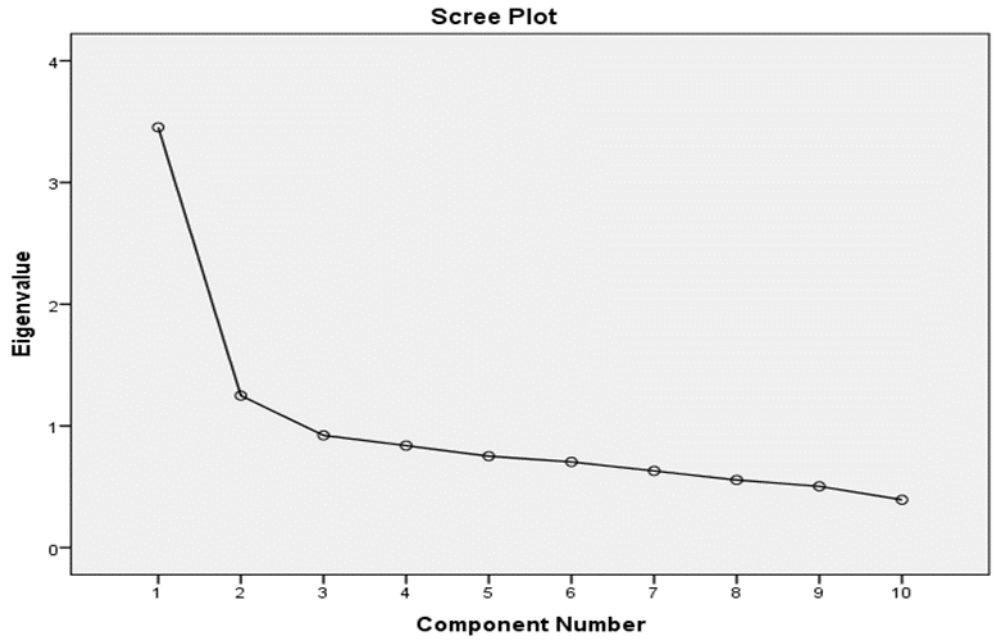


Figure 8. IQ Scree Plot Analysis.

The results of the PCA factor analysis suggested that one factor for SVQ with a cumulative variance of 51% should be retained. Table 12 below shows the cumulative variance for the one component.

Table 12. SVQ-Total Variance Explained.

	Initial Eigenvalues			Extraction Sums of Squares Loadings		
Component	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	2.045	51.130	51.130	2.045	51.130	51.130
2	.763	19.086	70.216			
3	.636	15.900	86.116			
4	.555	13.884	100.000			

Extraction Method: Principal Component Analysis.

The results of the PCA factor analysis suggested that one factor for II with a cumulative variance of 56% should be retained. Table 13 below shows the cumulative variance for the one component.

Table 13. II-Total Variance Explained.

	Initial Eigenvalues			Extraction Sums of Square Loadings		
Component	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	2.270	56.754	56.754	2.270	**56.754**	**56.754**
2	.709	17.729	74.483			
3	.541	13.517	88.000			
4	.480	12.000	100.000			

Extraction Method: Principal Component Analysis.

Following from the EFA analysis, 30 items were retained for further analysis. The items were distributed according to the EFA result. The SQ factor retained 12 items on four components. The IQ variable retained 10 items on three components. SVQ retained four items on one component. II retained four items on one component. Three items were eliminated from further analysis. Following from previous research and the initial PCA extraction method, the researcher grouped the items for SQ, IQ, SVQ, and II as shown in Tables 14–17 below.

Table 14. EFA Result for System Quality Variable.

SQ Items	Components			
System Quality	**1**	**2**	**3**	**4**
SQ3	.780			
SQ4	.662			
SQ12	.553			
SQ5	.455			
SQ9		.679		
SQ2		.670		
SQ14		.652		
SQ1		.453		
SQ8			.725	
SQ6			.617	
SQ7			.558	
SQ11				.796
SQ13				.733
SQ10				.488

Table 15. EFA Result for Information Quality Variable.

IQ-Items	Components		
Information Quality	**1**	**2**	**3**
IQ2	.708		
IQ9	.629		
IQ5	.629		
IQ6	.611		
IQ1	.596		
IQ7		.679	
IQ3		.489	
IQ8			.595
IQ4			.681
IQ10			.797

Table 16. EFA Result for Service Quality Variable.

SVQ-Items	Components
Service Quality	**1**
SVQ2	.753
SVQ1	.713
SVQ5	.704
SVQ4	.597
SVQ3	.585

Table 17. EFA Result for the Individual Impact Variable.

SVQ-Items	Components
Individual Impact	**1**
II1	.784
II2	.782
II3	.777
II4	.664

Reliability and Validity Results

After the EFA result, the researcher investigated the items' reliability, internal consistency reliability, convergent validity, and discriminant validity measures. The PLS path-modeling estimation in SmartPLS 3 provided the composite reliability, Cronbach's alpha, and the AVE for all research variables. All indicators' reliability values were greater than the minimum 0.4 level recommended by Wong (2013).

Convergent Validity

The computed AVE values ranged from 0.5 to 0.622 for all latent variables. As a result, this confirmed the convergent validity of the measurement model. Items not meeting the 0.5 requirement for AVE were considered for deletion. The composite reliability values exceeded the recommended 0.7 level (Hair et al., 2011; Wong, 2013). Table 18 shows AVE and the composite reliability for all variables.

Table 18. Average Variance Extracted.

Variables	Average Variance Extracted (AVE)	Composite Reliability
II	0.567	0.839
IQ-Output	0.501	0.834
IQ-Content	0.622	0.766
IQ-Usability	0.657	0.785
SQ-Efficiency	0.499	0.738
SQ-Flexibility	0.631	0.748
SQ-Sophistication	0.549	0.786
SQ-System Features	0.557	0.787
SVQ-Service Quality	0.558	0.799

Discriminant Validity

To measure discriminant validity, the researcher explored all items' cross loadings. The Fornell–Larcker criterion showed that discriminant validity is met because the square root of the AVE for each latent variable was greater than the correlations among the latent variables (Hair et al., 2011; Wong, 2013).

The result for discriminant validity analysis shows that each indicator's outer loading on the associated construct was greater than all of its loadings on other constructs. The result for discriminant validity is shown in Table 19 below.

Table 19. Fornell–Larcker Criterion Confirming Discriminant Validity.

	II	**Output**	**Content**	**Currency**	**Flexibility**	**Sophistication**	**System Features**	**SVQ**	**Usability**
II	0.753								
IQ-Output	0.591	0.708							
IQ-Content	0.329	0.302	0.789						
SQ-Currency	0.248	0.206	0.261	0.700					
SQ-Flexibility	0.366	0.488	0.177	0.234	0.712				
SQ-Sophistication	0.586	0.587	0.195	0.257	0.508	0.742			
SQ-System Features	0.459	0.557	0.228	0.300	0.475	0.502	0.744		
SVQ	0.493	0.552	0.360	0.250	0.339	0.443	0.458	0.708	
IQ-Usability	0.564	0.548	0.227	0.214	0.456	0.537	0.415	0.436	0.741

Multicollinearity Analysis

Multicollinearity tests for linear relationships among the variables in the model were performed (Chatterjee & Hadi, 2006). Multicollinearity occurs when two indicators are highly correlated. To assess collinearity, the researcher evaluated both the tolerance level and the VIF values of the research model. When more than two indicators are involved, it is called multicollinearity. If collinearity is indicated by the tolerance or VIF guidelines,

one should consider eliminating constructs or combining predictors into a single construct to eliminate the collinearity problem. A tolerance level less than 0.20 and a VIF value greater than 5 indicate a collinearity problem. The result of this research indicated that both the tolerance level and the VIF values are within the acceptable guidelines recommended by Hair et al.'s (2014) research. The result of this analysis implied a low level of multicollinearity. Multicollinearity results are shown in Table 20 below.

Table 20. Variance Inflation Factor Values and Tolerance Level.

Variables	**VIF**	**Tolerance Level**
II		
IQ-Output	2.250	>0.2
IQ-Content	1.214	>0.2
IQ-Usability	1.517	>0.2
SQ-Efficiency	1.181	>0.2
SQ-Flexibility	1.551	>0.2
SQ-Sophistication	1.889	>0.2
SQ-System Features	1.697	>0.2
SVQ-Service Quality	1.649	>0.2

Research Question One

Research Question One: What are the critical factors for SQ, IQ, SVQ, and II?

To address research question one, the researcher conducted reliability and validity analyses for all items extracted from the EFA via PCA. The result of this analysis identified the critical factors for SQ, IQ, SVQ, and II. The critical factors for SQ, IQ, SVQ, and II are listed in Table 21 below.

Table 21. Main Study EFA Result.

Factors	**Items**
SQ–System features	
Requirements	SQF1
System Accuracy	SQF2
Features	SQF3
SQ–Sophistication	
Ease of Use	SQS1
Efficiency	SQS2
Integration	SQS3

SQ–Flexibility		
	Flexibility	SQFL1
	Reliability	SQFL2
	Sophistication	SQFL3
SQ–Efficiency		
	Customization	SQE1
	Data Currency	SQE2
	Access	SQE3
IQ–Output		
	Importance	IQO1
	Availability	IQO2
	Relevance	IQO3
	Format	IQO4
	Timeliness	IQO5
IQ–Content		
	Content Accuracy	IQC1
	Uniqueness	IQC2
IQ–Usability		
	Usability	
	Understandability	
	Conciseness	
SVQ–Service Quality		
	Responsiveness	SVQ1
	Accuracy	SVQ2
	Training	SVQ3
	Tangible	SVQ4
II–Individual Impact		
	Learning	II1
	Awareness/Recall	II2
	Decision effectiveness	II3
	Individual productivity	II4
Users' Characteristics		
	Gender	UC1
	Age	UC2
	Experience	UC3
	Position	UC4
	Education	UC5

Following from the EFA, validity, and reliability analyses, the updated research model below shows all of the latent variables and their success indicators. The demographic variables are used as moderating variables in the research model.

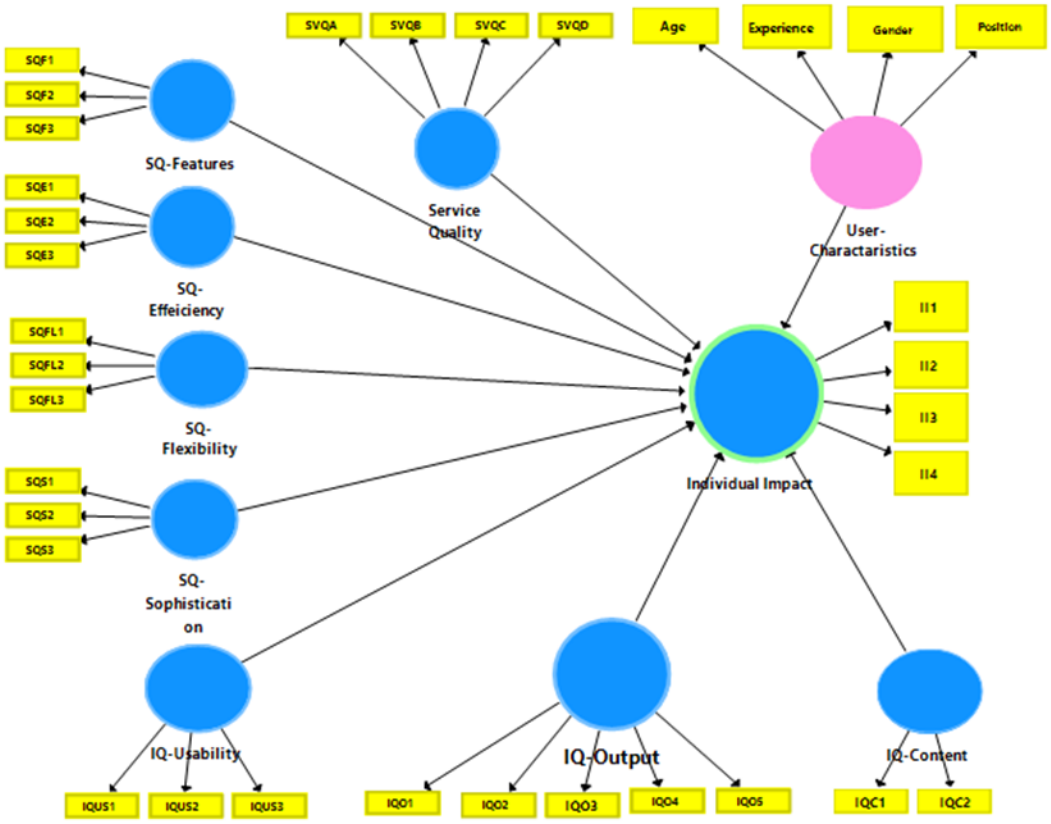


Figure 9. Updated Research Model.

Partial Least Squares Structural Equation Modeling Results

In this section, the researcher provides answers to research questions two and three. In addition, the hypotheses were tested to validate the research model.

Research Question Two

Research Question Two: Which of the latent variables SQ, IQ, and SVQ has the highest level of importance to the II variable?

The following preliminary observations indicate that SQ, IQ, and SVQ explain 51% of the variance in the II variable. The inner model indicates that SQ-Sophistication (0.264) has the strongest effect on II, followed by IQ-Usability (0.238), IQ-Output (0.204), IQ-

Content, and Service Quality (0.108). A higher R^2 value indicates higher level of accuracy (Hair et al., 2011).

The hypothesized path relationships for SQ-Efficiency, SQ-Features, and SQ-Flexibility are not significant. This suggests that there is a weak relationship between SQ-Efficiency, SQ-Features, and SQ-Flexibility and the II latent variable. As a result, the preliminary observation concluded that SQ-Sophistication, IQ-Usability, IQ-Output, IQ-Content, and SVQ are predictors of II. Table 22 below shows a summary of the path coefficients and R^2 value.

Table. 22. Structural Path Significance in Bootstrapping.

Relationships	**Path Coefficients**	***R*²**
II		**(50.7%)**
IQ–Output → II	**0.204**	
IQ–Content → II	**0.114**	
IQ–Usability→ II	**0.238**	
SQ–Efficiency → II	0.030	
SQ–Flexibility → II	–0.085	
SQ–Sophistication → II	**0.264**	
SQ–System Features → II	0.067	
Service Quality → II	**0.108**	

The research model below shows the path coefficients and R^2 for the SQ, IQ, SVQ, and II variables.

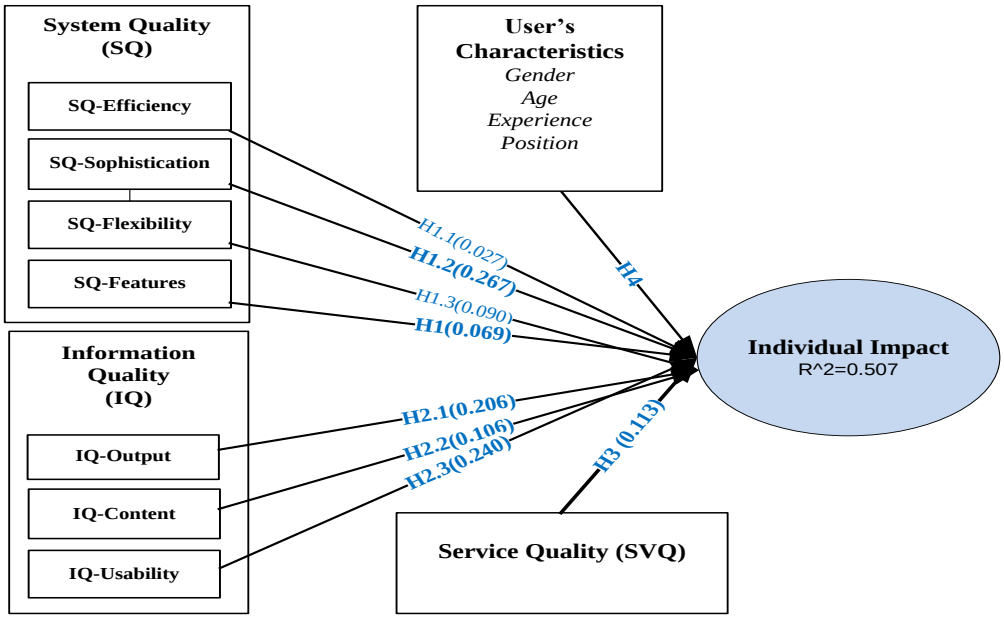


Figure 10. Research Model Path Coefficients and R^2 Value.

The outer model loadings indicated that all values are above the .6 level and are statistically significant. This implies that the model estimations are within the acceptable range for a structural model (Wong, 2013). Table 23 below shows the outer loadings, *t* values, and *p* values for all observed factors.

Table 23. Outer Loadings, *t* values and *p* values.

Loadings	**Original Sample (O)**	***T* Statistics (|O/STDEV|)**	***P* Values**
II1 ← II	0.778	20.710	.000
II2 ← II	0.767	17.276	.000
II3 ← II	0.799	27.151	.000
II4 ← II	0.660	10.446	.000
IQC1 ← IQ-Content	0.725	6.945	.000

IQC2 ← IQ-Content	0.848	10.829	.000
IQO1 ← IQ-Output	0.757	17.088	.000
IQO2 ← IQ-Output	0.709	14.102	.000
IQO3 ← IQ-Output	0.676	11.062	.000
IQO4 ← IQ-Output	0.711	12.508	.000
IQO5 ← IQ-Output	0.684	11.111	.000
IQUS1 ← Usability	0.761	15.034	.000
IQUS2 ← Usability	0.690	9.699	.000
IQUS3 ← Usability	0.770	16.477	.000
SQE1 ← SQ-Efficiency	0.825	6.257	.000
SQE2 ← SQ-Efficiency	0.633	3.669	.000
SQE3 ← SQ-Efficiency	0.622	3.667	.000
SQF1 ← SQ-System Features	0.703	8.783	.000
SQF2 ← SQ-System Features	0.816	17.540	.000
SQF3 ← SQ-System Features	0.708	9.588	.000
SQFL1 ← SQ-Flexibility	0.587	4.404	.000
SQFL2 ← SQ-Flexibility	0.888	17.490	.000
SQFL3 ← SQ-Flexibility	0.623	4.974	.000
SQS1 ← SQ-Sophistication	0.690	12.953	.000
SQS2 ← SQ-Sophistication	0.798	17.641	.000
SQS3 ← SQ-Sophistication	0.734	10.876	.000
SVQA ← Service Quality	0.613	7.131	.000
SVQB ← Service Quality	0.700	11.631	.000

SVQC ← Service Quality	0.704	12.434	.000
SVQD ← Service Quality	0.802	20.104	.000

Structural Model Assessment

This section provides the assessment of the structural research model. According to Hair et al. (2014), assessing the structural model in PLS-SEM requires the following four steps: (1) assessing the significance of the path coefficients, (2) assessing the level of the R^2 value, (3) assessing the f^2 effect size, and (4) assessing the prediction relevance (q^2). The assessment of the structural model was based on the R^2 for the endogenous variable, the path coefficient (β), the effect size (f^2) and the prediction relevance (q^2) (Henseler et al., 2009; Tenenhaus, Vinzi, Chatelin, & Lauro, 2005).

Path estimation was performed to examine the significance of the path relations in the structural model (Chin, 1998). The significance of each path was based on the *t* value resulting from the PLS bootstrap procedure. The result of the path analysis indicated that four out of the seven latent variables were significant. This implies that the model is within the acceptable fit for the path coefficient (β).

The R^2 measures how much variability is explained by the exogenous variables (Hair et al., 2014). Based on the R^2 values, SQ, IQ, and SVQ explained 51% of the variance in the II variable. The inner model showed that SQ-Sophistication (0.264) has the strongest effect on II, followed by IQ-Usability (0.238), IQ-Output (0.204), IQ-Content, and Service Quality (0.108). This implies that the model is within the acceptable fit for the R^2.

The strength of the effect size was also investigated. According to Chine (1998), the strength of the effect is classified as follows, a value of 0.02 indicates a weak effect, 0.15 indicates a medium effect, and 0.35 indicates a strong effect. This research provided the values IQ-Output → II, (0.201), IQ-Content → II (0.114), IQ-Usability → II (0.238), SQ-Efficiency → II (0.025), SQ-Flexibility → II (–0.070), SQ-Sophistication → II (0.264), System Features → II (0.067), and Service Quality → II (0.108). As a result, the research concluded that more than half of the relations provided an acceptable total effect and effect size ($f^2 > 0.02$) (Hair et al., 2014).

Following evaluation of the R^2 value, the researcher examined the model's predictive relevance. Hair et al. (2014) noted that when PLS-SEM exhibits predictive relevance, it accurately predicts the data points of indicators in endogenous models. The Q^2 value was estimated using the blindfolding procedure. Blindfolding is used to obtain cross-validated redundancy measures for each endogenous construct. If the result for the Q^2 value is greater than 0, it indicates that the exogenous constructs have predictive relevance for the endogenous construct. In this study, the result of the blindfolding procedure for the structural model indicated a Q^2 value of .263, which is larger than zero, which implies that the model is within the acceptable fit for predictive relevance (Hair et al., 2014).

After examining the effect size and predictive relevance, some authors recommend assessing the goodness of fit (GoF) of the model (Tenenhaus et al., 2005). However, other authors suggested that GoF should not be used for assessing a structural model in SmartPLS (Hair et al., 2014). The GoF value is usually between 0 and 1, where the higher value represents better estimation (Henseler et al., 2009). Wetzels, Odekerken-Schröder,

and Van-Oppen (2009) classified the effect of the GoF as small (GoF = 0.1), medium (GoF = 0.25), and large (GoF = 0.36).

The result of the GoF indicated a value of 0.551. The observed GoF (0.551) is greater than the 0.36 recommended by Wetzels et al.'s (2009) research. Based on the GoF value, the PLS model was validated for an acceptable goodness of fit.

Structural Path Significance in Bootstrapping

SmartPLS provides the *t* statistics for significance testing of the model. It uses a procedure called bootstrapping by providing the approximate *t* value for significance testing of the structural path. The bootstrapping result approximates the normality of data and permits testing the research hypotheses. The complete bootstrapping process includes 5000 subsamples and a two-tailed test with $\alpha = 0.05$ significance level. The path coefficient is considered significant when the *t* statistic is greater than 1.96. If the significance level is 0.1, the path coefficient will be significant for all *t* statistics greater than 1.65 (Wong, 2013). After completing the bootstrapping, the results from the *t* statistics and the *p* value confirmed that IQ-Output, SQ-Sophistication, and IQ-Usability paths are statistically significant. SQ-Sophistication showed the strongest effect on II, followed by IQ-Usability, and IQ-Output. Table 24 below shows the structural path significance in bootstrapping.

Table 24. Structural Path Significance in Bootstrapping.

	Original Sample	**Mean**	**Standard deviation**	***T* Statistics**	***P* Values**
IQ-Output → II	**0.204**	**0.205**	**0.090**	**2.272****	**.023**
IQ-Content → II	**0.114**	**0.114**	**0.060**	**1.884***	**.060**
IQ-Usability → II	**0.207**	**0.202**	**0.070**	**2.956*****	**.003**
SQ-Efficiency → II	0.030	0.036	0.062	0.479	.632

SQ-Flexibility → II	-0.085	-0.076	0.077	1.108	.268
SQ-Sophistication → II	**0.291**	**0.291**	**0.073**	**4.013******	**.000**
SQ-System Features → II	0.078	0.077	0.063	1.240	.215
Service Quality → II	**0.108**	0.115	0.069	1.554	.120

P < .1*; *P* < .05**; *P* < .01***; *P* < .001****

Based on the above results, the researcher provided the answers to research question two.

Research Question Two: *Which of the latent variables SQ, IQ, and SVQ has the highest level of importance to the II variable?*

To address research question two, the researcher performed a PLS path analysis on the research model. The PLS path analysis results showed that the path coefficients for IQ-Output, SVQ, SQ-Sophistication, and IQ-Usability are greater than 0.1. A significant path in the outer model indicated that these latent variables had an effect on the II latent variable. SQ-Sophistication from the SQ latent variable was found to have the strongest effect on the II variable. IQ-Usability and IQ-Output were found to have a direct effect on the II variable. The hypothesized path between SVQ and II is statistically significant at $p < .1$, with a path coefficient of 0.108. This implies that SVQ has a weak effect on the II variable.

Service Quality

To add value to this research, the researcher investigated the relationship between SVQ and IQ-Output, IQ-content, IQ-Usability, SQ-Efficiency, SQ-Flexibility, SQ-Sophistication, and SQ-System Features. The purpose of this test was to understand if SVQ influences users' perceptions of SQ and IQ. The result revealed that SVQ impacted users' opinions when evaluating the SQ and IQ of an ERP system. Service quality and employee satisfaction are very important for organizations to achieve ERP success. Table 25 below shows the *t* statistics and *p* values for all paths.

Table 25. Service Quality Impact on all Latent Variables.

	Original sample	Mean	Standard deviation	*T* Statistics	*P* Value
Service Quality → IQ-Output	0.557	0.563	0.056	**9.916**	**.000**
Service Quality → IQ-Content	0.363	0.366	0.071	**5.099**	**.000**
Service Quality →SQ-Efficiency	0.248	0.258	0.071	**3.510**	**.000**
Service Quality → SQ-Flexibility	0.357	0.362	0.082	**4.358**	**.000**
Service Quality → SQ-Sophistication	0.441	0.447	0.063	**7.050**	**.000**
Service Quality → SQ-System Features	0.459	0.465	0.061	**7.536**	**.000**

Users' Characteristics–Moderation Effects

Research Question Three

Research Question Three: *Is there any moderating effect of UCs on the strength of a relationship between the independent variables and the dependent variables?*

In this chapter, the researcher examined the four moderating effects of Gender, Age, Position, and Experience. Each test required splitting the sample into two different groups. The moderation effects of gender, age, position, and experience were examined individually. According to Henseler et al. (2009), a PLS-MGA result is statistically significant if the *p* value is less than .05 or greater than .95.

Before conducting the PLS-MGA analysis, the researcher assessed the reliability and validity for all items in each group. The results revealed that the reliability of all indicators met the minimum threshold of 0.4 recommended by Wong (2013). The composite reliability values exceeded the 0.7 level (Hair et al., 2011; Wong, 2013). The discriminant

validity test showed that discriminant validity existed because the square root of the AVE for each latent variable was larger than the correlations among the latent variables (Hair et al., 2011; Wong, 2013).

Moderator–Gender

Gender analysis is presented in Table 26 below. The *p* value indicates if there is a significant difference between the two groups. Based on the analysis from PLS-MGA, the result indicates a difference between men and women regarding the II variable. It shows that SVQ → II has a significant difference in the group-specific parameter estimates for outer weights, outer loadings, and path coefficients. The result is shown in Table 26 below.

Table 26. Gender–PLS-MGA.

	Path Coefficients-diff (|Gender(1.0) – Gender(2.0)|)	***p* Value (Gender(1.0) vs Gender(2.0))**
IQ-Output → II	0.074	0.371
IQ-Content → II	0.080	0.663
SQ-Efficiency → II	0.069	0.325
SQ-Flexibility → II	0.034	0.418
SQ-Sophistication → II	0.193	0.858
SQ-System Features → II	0.120	0.798
Service Quality → II	**0.279**	**0.033**
IQ-Usability → II	0.281	0.941

To address research question three for gender, the result from the PLS-MGA revealed that the relationship between the SVQ and II variables was moderated by gender. The perception of the II variable was increased with the increase of the perception of SVQ by the gender group women. Following from this, one can conclude that women are more concerned with the SVQ when evaluating the ERP systems.

Moderator–Age

The moderating effect of age was examined using PLS-MGA. The sample was split into two groups. The first group is under the age of 30 and the second group is above the age of 30. The result indicated a difference in opinions between the two groups for IQ-

Output → II, IQ-Content → II, and Service Quality → II. The result is shown in Table 27 below.

Table 27. Age–PLS-MGA.

	Path Coefficients-diff (|Age(1.0) – Age(2.0)|)	***p* Value (Age(1.0) vs Age(2.0))**
IQ-Output → II	**0.447**	**.012**
IQ- Content → II	**0.231**	**.964**
IQ-Usability → II	0.227	.909
SQ-Efficiency → II	0.161	.121
SQ-Flexibility → II	0.101	.653
SQ-Sophistication → II	0.012	.536
SQ-System Features → II	0.012	.539
SVQ → II	**0.263**	**.970**

To address research question three for the age, the result from the PLS-MGA indicated that IQ-Output → II, IQ-Content → II, and Service Quality → II are moderated by the age variable. The effect of perception of the II variable was increased with the increase of the perception of IQ-Output → II by the age group <30.

The effect of perception of the II variable was increased with the increase of the perception of Service Quality → II and IQ-Content → II by the age group >30. Following from this, one can conclude that age group <30 is more concerned with the importance, availability, relevance, format, and timeliness when evaluating ERP success, while age group >30 is more concerned with the responsiveness, accuracy, training, tangibility, content accuracy, and uniqueness when evaluating ERP success.

Moderator–Position

The moderating effect of position was examined using SmartPLS-MGA. The sample was split into two groups. The groups were categorized as general employees and management team. The result in the table below shows that IQ-Output → II and SVQ → II made a significant difference between the two groups. The result of the MGA analysis is listed in Table 28 below.

Table 28. Position–PLS-MGA.

	Path Coefficients-diff (|Position(1.0) – Position(2.0)|)	***p* Value (Position(1.0) vs Position(2.0))**
IQ-Output → II	**0.482**	**.004**
IQ-Content → II	0.160	.918
SQ-Efficiency → II	0.126	.160
SQ-Flexibility → II	0.135	.728
SQ-Sophistication → II	0.020	.555
SQ-System Features → II	0.009	.473
SVQ → II	0.182	.887
IQ-Usability → II	0.184	.881

To address research question three for the position, the result from the PLS-MGA indicated that IQ-Output → II for the position groups has a significant difference in the group-specific parameter estimates. The effect of perception of the II variable was increased with the increase of the perception of IQ-Output → II by the regular employees.

Following from this, one can conclude that regular employees are more concerned with the importance, availability, relevance, format, and timeliness when evaluating ERP success, while management employees are concerned with all of the IS success factors.

Moderator–Experience

The moderating effect of experience was examined using the SmartPLS-MGA method. The sample was split into two groups. The first group identified those employees with less than three years of experience and the second group identified those employees with three or more years of experience. The results showed that IQ-Content → II made a significant difference between the two groups. The result of the MGA analysis is listed in Table 29 below.

Table 29. Experience–PLS-MGA.

	Path Coefficients-diff (|Experience(1.0) – Experience(2.0)|)	***p* Value (Experience(1.0) vs Experience(2.0))**
IQ-Output → II	0.187	.150
IQ-Content → II	**0.232**	**.969**
SQ-Efficiency → II	0.158	.129
SQ-Flexibility → II	0.101	.312
SQ-Sophistication → II	0.228	.927
SQ-System Features → II	0.023	.436
Service Quality → II	0.050	.639
IQ-Usability → II	0.070	.328

To address research question three for experience, the result from the PLS-MGA indicated that the effect of perception of the II variable was increased with the increase of the perception of IQ-Content → II by those employees with three or more years of experience. The effect of perception of the II for the other constructs was similar for both groups.

Following from this result, it can be concluded that employees with more experience were concerned with the content accuracy and uniqueness when evaluating ERP success.

Comparison with Previous Studies

Research Question Four

Research Question Four: *Do system quality, IQ, and service quality differ between the findings of this study and the summarized findings in Petter et al.'s (2008) research results?*

Petter et al. (2008) reviewed 180 research papers related to IS success for the period 1992–2007. The authors used the six dimensions of the D&M model–SQ, IQ, SVQ, use, user satisfaction, and net. The authors examined the relationships that comprise the D&M

IS success model in both individual and organizational contexts. The result of their research showed that there is moderate to strong support for the II variable.

The result of this research is comparable to the summarized research of Petter et al. (2008). Overall, the outcome of this research indicated the following results.

The SQ variable, which includes ease of use, efficiency, and integration indicated strong support for the II variable. However, the items' requirements, system accuracy, features, flexibility, reliability, sophistication, customization, data currency, and access indicated weak support for the II variable. It appears that ERP users in the Middle East are more concerned with the ease of use, efficiency, and integration of the system. Following from the research results of Petter et al. (2008), it appears that ERP users in developed countries are concerned with all of the SQ factors when evaluating the ERP systems success.

The IQ variable, which includes importance, availability, relevance, format, timeliness, content accuracy, uniqueness, usability, understandability, and conciseness, indicated strong support for the II variable. It appears that ERP users in the Middle East are more concerned with the IQ variable when evaluating ERP system success. Following from the research results of Petter et al. (2008), it appears that ERP users in developed countries are also concerned with the IQ factors when evaluating ERP success. Both results showed moderate to strong support for the II variable.

The result for the SVQ variable indicated weak support for the II variable. It appears that ERP users in the Middle East are less concerned with the SVQ when evaluating ERP system success. Following from the research results of Petter et al. (2008), it appears that

ERP users in developed countries are concerned with the SVQ when evaluating ERP success.

Following from this, it can be confirmed that IQ has the strongest effect on the II variable, followed by SQ. The SQ variable provided partial support. SVQ provided weak support to the II variable. The two results are noted in Table 30 below.

Table 30. Comparison of Research Results.

Relationship	Current Research Results in the Middle East	Petter et al.'s (2008) research results
System Quality(SQ) → II	Moderate Support	Moderate to Strong Support
Information Quality(IQ) → II	Moderate Support	Moderate to Strong Support
Service Quality(SVQ) → II	Weak Support	Moderate to Strong Support

Findings Related to Culture and Information System Success

The literature in the field of IS clearly indicates that culture is an important factor for the success or failure of IS projects. Talet and Alwahaishi (2011) asserted that an IS implemented successfully in one culture may be a failure in another. Many different cultural dimensions have been identified and researched over the years. One of the most significant authors is Hofstede, who described four cultural dimensions: power distance, uncertainty avoidance, individualism/collectivism, and masculinity/femininity (Bass, 1990). Power distance describes the degree to which a society accepts inequality in the distribution of power within that society. Uncertainty avoidance is the degree to which a culture feels comfortable in unstructured situations. Individualism/collectivism details the degree to which individuals in a culture define themselves as individuals or according to their place within the group. Masculinity/feminism is the degree to which a culture

demonstrates characteristics considered to be masculine, for example valuing achievement, or feminine, for example valuing relationships (Hofstede, 1993).

Hofstede longitudinally examined 53 nations to identify differences in management. In 1991, Hofstede extended his original study and included data for an additional 10 countries in three different regions: the Middle East, West Africa, and East Africa. Hofheinz (2005) performed a comparison between the Arab world and the United States using Hofstede's cultural dimensions. The author concluded that the Arab culture is high in power distance and uncertainty avoidance, the American culture is high in individualism and masculinity.

Leidner and Kayworth (2006) underscored the importance of culture and how it is linked to the success of IS. Erumban and Jong (2006) pointed out that cultural factors influence the implementation of new technologies across countries. The authors concluded that Middle Eastern countries, with high scores in UA and PD, have a lower rate of IS implementation success than countries with low UA and PD scores. Leidner and Kayworth (2006) stated that UA plays a significant role in determining how groups will potentially accept or reject an IS.

Following from the differences in results between this research and that of Petter et al. (2008), the results of this research agree with the claim made by Leidner and Kayworth (2006) and Erumban and Jong (2006) that Middle Eastern countries, with high scores in UA and PD, have a lower rate of IS success than countries with low UA and PD scores. One of the main reasons for this agreement was that users' perceptions of ERP success in the Middle East were different from users' perceptions of ERP success in more developed countries.

Dorfman and Howell (1980) asserted that people in low UA cultures tend to accept sudden changes in the workplace. Hofstede (1980) noted that people in low UA cultures find new ways to accomplish given tasks (Gunton, 1988; Hofstede, 1980). Previous literature (Gunton, 1988; Panko, 1988) concluded that technology is more accepted when it permits the users to decide how to utilize it. As a result, users may use their own skills to improve their job performance. As previously mentioned, positive II is related to ERP success. Following from the above, one can note that cultural factors play a significant role in how users evaluate IS success. As a result, this may have impacted users' opinions in evaluating ERP success in this dissertation study. Further research is needed to explore whether the difference in findings is actually related to the cultural differences between the Middle East and developed countries.

Hypotheses Findings

Following from the data analysis and results, the following results for the hypotheses testing were obtained. The hypotheses results are noted in Table 31 below.

Table 31. Hypotheses Testing Results.

Hypotheses	Supported
System Quality → Individual Impact (H1)	**(Yes)**
Efficiency (H1.1)	No
Sophistication (H1.2)	**Yes**
Flexibility (H1.3)	No
Features (H1.4)	No
Information Quality → Individual Impact (H2)	**(Yes)**
Output (2.1)	**Yes**
Content (2.2)	**Yes**

Usability (2.3)	**Yes**
Service Quality → Individual Impact (H3)	(No)
Users' Characteristics–Moderation Effects (H4)	**Yes**

The overall findings of the analysis indicated that SQ, IQ, and SVQ are determinants of ERP success at the individual level. However, the path coefficient for SVQ indicated weak support for the II variable.

Hypothesis One: *There is a positive relationship between the SQ factors and the II factors.*

Under the SQ construct, SQ-Sophistication indicated a positive relationship with the II construct. The factors in SQ-Sophistication are ease of use, efficiency, and integration. Efficiency (H1.1), Flexibility (H1.3), and Features (H1.4) did not show any relationships with the II variable.

Hypothesis Two: *There is a positive relationship between the IQ factors and the II factors.*

The IQ construct showed a positive relationship with the II factors. IQ-Output, IQ-Content, and IQ-Usability are determinants of the II variable. As a result, H2 provided strong support to the II variable.

Hypothesis Three: *There is a positive relationship between the SVQ variable and the II variable.*

The relationship between SVQ and II was not statistically significant. However, SVQ showed weak support for the II variable. As a result, the hypothesis was rejected.

Hypothesis Four: *There is a significant difference between the different groups in UCs.*

Users' Characteristics–Gender

Based on the analysis from PLS-MGA, the result indicated a difference between men and women regarding the II variable. It shows that SVQ → II for gender has a significant difference between the two groups. The factors IQ-Output → II, IQ-Content → II, SQ-Efficiency → II, SQ-Flexibility → II, SQ-Sophistication → II, and SQ-Features → II did not show any differences in their parameter estimates.

Users' Characteristics–Age

The result shows that IQ-Output → II, IQ-Content → II, and Service Quality → II have significant differences between the two different groups. SQ-Efficiency → II, SQ-Flexibility → II, SQ-Sophistication → II, and SQ-System Features → II did not show any differences in their parameters between the two groups.

Users' Characteristics–Position

The position group analysis indicated that IQ-Output → II and SVQ → II have a significant difference in their group-specific parameter estimates. The effect of perception of the II variable was moderated with the increase in the perception of IQ-Output → II by the regular employees. The SVQ path coefficient was moderated by the management group.

Following from this, one can conclude that regular employees were more concerned with the IQ-Output when evaluating ERP success, while management employees were concerned with the SVQ. As a result, H4.3 was partially supported.

Users' Characteristics–Experience

The result indicated that the effect of perception of the II variable for IQ-Content → II was moderated by those employees with three or more years of experience. Following from

this, one can conclude that employees with more experience were concerned with the IQ-Content → II when evaluating the ERP systems success.

Summary

The purpose of this study was to understand the factors that contribute to ERP success, and to determine whether the relative importance of the IS factors differ between the research results in this study and the research results found in previous research. In addition, this research determined whether UCs moderate the relationships between SQ, IQ, SVQ and the II variable. The effect was examined using the MGA method.

Chapter 4 presented the data collection process and the screening process for both the pilot study and the main study. The reliability of the data was based on Cronbach's alpha and validated through convergent and discriminant validity. EFA was performed to identify the underlying relationships between the measured variables. PCA was performed as a method of extraction for a maximal amount of variance for the observed variable. The hypothesized relationships in the conceptual model of SQ, IQ, and SVQ were validated using the PLS method, a version of SEM used in performing CFA. The moderating effect of gender, age, position, and experience on the II variable was tested using the SmartPLS MGA technique. The analysis revealed that SQ and IQ are indicators of ERP success in the Middle East. UCs were found to have a moderating effect on the strength of a relationship between the independent variables and the dependent variable. The research determined whether the relative importance of the IS factors differs between the research results in this study and the research results found in Petter et al.'s (2008) summarized research.

Chapter 5

Conclusions, Implications, Recommendations, and Summary

Conclusions

The following research questions were identified for the current dissertation study.

- ✓ **Research Question One**: What are the critical factors for SQ, IQ, SVQ, and II?
- ✓ **Research Question Two**: Which of the constructs SQ, IQ, and SVQ has the highest level of importance to the II latent variable?
- ✓ **Research Question Three**: Is there any moderating effect of UCs on the relationship between the independent variables and the dependent variable?
- ✓ **Research Question Four**: Do the findings of this research differ from the findings of Petter et al.'s (2008) research results?

The following hypotheses were identified for the current dissertation study.

- ✓ ***H1:*** *There is a positive relationship between the SQ factors and the II factors.*
- ✓ ***H2:*** *There is a positive relationship between the IQ factors and the II factors.*
- ✓ ***H3:*** *There is a positive relationship between the SVQ factors and the II factors.*
- ✓ ***H4:*** *There is a moderating effect of UCs on the relationship between the independent variables and the dependent variable.*

In this chapter, the researcher provides the conclusions, implications, recommendations, and a summary of the research results. The research goals, research questions, and hypotheses are discussed in the following sections. Chapter 5 concludes with recommendations for future research.

The goals of this study were to understand the factors that contribute to ERP system success at the individual level and to determine whether the relative importance of the IS factors differ between the results in this study and the results found in previous research. In addition, this research determined whether UCs moderate the II variable. This study validated an IS success model at the individual level of analyses. As a result of this validation, the researcher was able to answer the four research questions and test the research hypotheses. Following the pilot study analysis, the quantitative process began with the development of a survey instrument to collect data for the main study. The main survey instrument was distributed to ERP users in the Middle East.

Research Question One

To address research question one, the researcher examined the reliability and validity for all items extracted from the EFA via PCA. The result of this analysis identified the important factors for SQ, IQ, SVQ, and II. Data collected were evaluated using the PLS method. The SQ variable includes ease of use, efficiency, integration, requirements, system accuracy, features, flexibility, reliability, sophistication, customization, data currency, and access. The IQ variable includes importance, availability, relevance, format, timeliness, content accuracy, uniqueness, usability, understandability, and conciseness. The SVQ variable includes responsiveness, accuracy, training, and tangible. The II variable includes learning, awareness/recall, decision effectiveness, and individual productivity. Following the EFA analysis, the author proceeded with the next phase of analysis to answer research question two.

Research Question Two

The PLS path analysis results indicated that the path coefficients for IQ, SVQ, and SQ-Sophistication are greater than 0.1. This indicates that the paths are significant (Wong, 2013). Data collected were evaluated under CFA using the PLS method. The R^2 was 0.509 for the II endogenous latent variable. The results showed that SQ, IQ, and SVQ explain 51% of the variance in the II variable. The inner model indicated that SQ-Sophistication (0.264) has the strongest effect on II, followed by IQ-usability (0.238), IQ-Output, IQ-Content, and SVQ. The hypothesized path relationships between SQ-Efficiency, SQ-Features, SQ-Flexibility, and II were found to be significant. After completing the structural path significance in bootstrapping, the *T* statistics and the *p* values confirmed that SQ-Sophistication has the strongest effect on II, followed by IQ-Usability and IQ-Output. *T* statistics and the *p* values for SVQ were less than the required threshold. As a result, the researcher concluded that SQ and IQ are the two main predictors of the II variable.

Research Question Three

The moderating effects of gender, age, position, and experience on the relationships between SQ, IQ, SVQ, and the II were tested using SmartPLS MGA (Henseler, 2012). A result is statistically significant if the *p* value is smaller than 0.05 or larger than 0.95 for a difference of group-specific path coefficients (Henseler et al., 2009).

The result from the PLS-MGA revealed that the relationship between SVQ and II variable was moderated by gender. The perception of the II variable was improved with the increase of the perception of SVQ by the gender group women. Following from this, one can conclude that women are more concerned with the SVQ factors when evaluating

ERP success. The result of the gender MGA did not indicate any differences between the two groups for the other variables.

The result from the PLS-MGA for the age moderator indicated that IQ-Output → II, IQ-content → II, and Service Quality → II have significant differences in their group-specific parameter estimates. The effect of perception of the II variable was moderated with the increase of the perception of IQ-Output → II by the age group <30. The effect of perception of the II variable was increased with the increase of the perception of SVQ → II and IQ-Content → II by the age group >30. This suggests that age group less than 30 years old is more concerned with the IQ-Output when evaluating ERP system success, while age group greater than 30 is more concerned with the Service Quality → II and IQ-Content → II when evaluating the ERP systems.

The result for the position group from the PLS-MGA indicated that IQ-Output → II for the position group has a significant difference in the group-specific parameter estimates. The effect of perception of the II variable was improved with the increase of the perception of IQ-Output → II by the regular employees.

Following from this, one can conclude that regular employees were more concerned with the IQ-Output when evaluating ERP success, while management employees were concerned with all of the success factors.

The experience group analysis indicated that the effect of perception of the II variable was increased with the increase of the perception of IQ-Content → II by those employees with three or more years of experience. The effect of perception of the II for the other constructs was similar for both groups

Research Question Four

To address research question four, the researcher concluded that SQ and IQ are predictors of the II factor. Overall, the results of this research revealed that SQ and IQ positively impact the dependent variable II. The *t* statistics for the SVQ variable did not indicate any significant relationship with the II variable.

The results of the research by Petter et al. (2008) indicated that SQ, IQ, and SVQ provide moderate to strong support for the II construct. The result of this research is comparable to the summarized research of Petter et al. (2008). The summarized research results are indicated below.

The SQ variable influences the II variable. It appears that ERP users in the Middle East are more concerned with the ease of use, efficiency, and integration of the ERP systems. Following from the research results of Petter et al. (2008), it indicated that ERP users in developed countries are concerned with the SQ variable when evaluating ERP success. Both results are in agreement that SQ influences the II variable, which represents ERP success at the individual level.

The IQ factors, which include importance, availability, relevance, format, timeliness, content accuracy, uniqueness, usability, understandability, and conciseness indicated strong support for the II variable. It appears that ERP users in the Middle East are more concerned with the IQ factors when evaluating ERP system success. The research results of Petter et al. (2008) indicated that ERP users in developed countries are also concerned with the IQ factors when evaluating ERP success. Both results showed moderate to strong support for the II variable.

The research result for the SVQ variable indicated weak support for the II variable. It appears that ERP users in the Middle East are less concerned with the SVQ when evaluating ERP system success. The research results of Petter et al. (2008) indicated that ERP users in developed countries are more concerned with the SVQ when evaluating ERP success.

The results of this research are also in agreement with the research results found in Gable et al. (2008) for SQ and IQ variables. Gable et al. (2008) concluded in their research that SQ and IQ are predictors of the II variable. As a result, both results indicated that SQ and IQ have moderate support for the II. However, this research found that the relationship between SVQ and the II variable is not statistically significant.

Cultural Factors and Information System

Following from the differences of results between this research and that of Petter et al. (2008), the result of this research is in agreement with the claim made by Leidner and Kayworth (2006) and Erumban and Jong (2006) that regions with high scores in UA and PD have a lower rate of IS success than countries with low UA and PD scores. One of the main reasons for this agreement was that users' perceptions of ERP success in the Middle East were different from users' perceptions of ERP success in more developed countries.

Previous literature (Gunton, 1988; Panko, 1988) asserted that technology is more accepted when it permits IS users to decide on how to use the technology effectively. Users may use their own skills to improve their job performance and productivity. Following from the above, one can assert that cultural factors play a significant role in how users evaluate IS success. As a result, this may have impacted users' opinions in evaluating ERP

success in this study. Further research is needed to explore whether the differences in findings are actually impacted by cultural differences.

Implications

The results of this research have some implications for ERP organizations in the Middle East. In addition, it has some implications for the literature on the Middle East. First, the results of this research highlighted the importance of SQ, IQ, and SVQ in promoting ERP success at the individual level. The researcher also considered users' opinions on the influence of SVQ on IQ and SQ. SVQ measures the level of the support the ERP vendors provide to ERP system users (Ifinedo et al., 2010). Therefore, it was worth investigating this relationship from the end users' perspectives. Understanding the relative importance of IS factors brings the attention of the organizations and vendors to focus their efforts on the critical success factors perceived by end users.

Second, this research assessed the level of IS impact from multiple users, this may help organizations to provide proper training to ERP users to develop better attitudes toward ERP systems. Organizations can also build a rigorous approach to assess the impacts of IS on ERP users' performance and productivity. As a result, this could help in improving productivity, learnability, awareness, and decision effectiveness of the end users. In addition, understanding the moderating effect of UCs may help organizations to attract the right employees to the right position.

Third, this research provided answers on whether the research result found in this study differs from the research result found in that of Petter et al. (2008). The result of this

comparison can be used by ERP vendors to deliver an integrated and customized ERP system to organizations based on region.

Last, the literature showed that there was a need to conduct ERP research in the Middle East. This research bridged the gap in literature on the need to conduct more ERP research in the Middle East. Middle Eastern organizations can use this research to understand better the ERP success factors that are perceived by end users. In addition, this research considered previous research on the role of culture in impacting IS success. As a result, understanding cultural factors and their influence on the evolution of ERP success may help managers to realign their management style and approach in managing employees.

To add value to this research, the author tested the relationship between SVQ and SQ and IQ. Understanding this relationship may help organizations to take actions to enhance IS SVQ in the work place.

Limitations

The dissertation study identified three limitations in this study. The first limitation was finding participants in the Middle East. The overall response rate was 38%; however, many participants failed to answer all survey questions, which led to many cases with missing values. This may have affected collecting enough responses for more accurate results. The second limitation was that the accuracy of responses to the questions depended on participants' truthfulness in their responses to the survey items, as well as on their prior experiences with the ERP systems. The third limitation was that this research was conducted only in one region. This may limit the generalizability of results globally.

Recommendations for Future Studies

The IS success model in this study was used to predict the importance of the independent factors from the ERP users' point of view and their impact on the overall II variable. The researcher investigated the relationships between SQ, IQ, SVQ, and the II variable. This research considered II variable as a final measure of ERP success, which means that the more positive the impact on users, the better is the ERP success at the individual level.

The first goal of this research was to understand the factors that contribute to the II variable in an ERP environment in the Middle East. The second goal was to determine whether the relative importance of the research variables differs between the research results in this study and the research results found in Petter et al.'s (2008) summarized research.

Various factors relevant to ERP success or failure have been highlighted in past research; however, the focus has been on ERP success in developed countries. Moreover, many developing countries expressed interest in achieving ERP success in their organizations. Following from this, the researcher conducted this research in the Middle East to bridge the gap in ERP research. Despite the large body of literature on ERP systems, there is a need to investigate the ERP system's success from the end users' perspectives (Kwak et al., 2012). In addition, Talet and Alwahaishi (2011) argued that an ERP system used successfully in one region might be a failure in other regions.

Future research may collect primary data from developed and developing countries to understand better the relationships and impacts of those factors on ERP success. In addition, further research may also include the cultural and organizational factors along

with the IS success factors to determine differences in results. The generalization of the recommended study findings may require the researcher to include more IS success factors for the study.

Summary

The goals of this study were to understand the factors that contribute to ERP system success at the individual level, and to determine whether the relative importance of the IS factors differs between the research results in this study and the research results found in previous research. In addition, this research was able to determine whether UCs moderate the relationships between SQ, IQ, SVQ and the II variable. This study validated an IS success model at the individual level of analyses. As a result of this validation, the researcher was able to answer the four research questions and the research hypotheses.

The present research conducted a pilot study to test the reliability and validity of all latent variables and their observed variables. The reliability of all items was identified using Cronbach's alpha. The reliability analysis indicated a Cronbach's alpha greater than .8 for reliability. Following the reliability analysis, the researcher conducted an EFA via PCA to discover the critical factors of SQ, IQ, and SVQ that influence ERP users. As a result, the EFA analysis retained 29 items for further analysis. The survey items were validated in previous research; however, the researcher reconfirmed the validation through convergent and discriminant validity. The researcher ascertained the convergent validity through the computed AVE in SmartPLS. The AVE was higher than the 0.5 threshold and fulfilled the criterion of convergent validity. The dissertation study examined the discriminant validity; the researcher explored all items' cross loadings and found that

discriminant validity was met because the square root of the AVE for each latent variable was greater than the correlations among the latent variables.

Based on the analysis of the pilot study, the researcher collected data for the main study. Following the data collection for the main study, the researcher conducted an EFA via PCA to discover the important factors of SQ, IQ, SVQ, and II. PLS-based SEM was used to validate the instruments based on CFA and path coefficients. The results of the PCA factor analysis suggested four factors for SQ with a cumulative variance of 59% should be retained. The results of the PCA factor analysis suggested three factors for IQ with a cumulative variance of 56% should be retained. The results of the PCA factor analysis suggested one factor for SVQ with a cumulative variance of 51% should be retained.

The results of the PCA factor analysis suggested one factor for II with a cumulative variance of 56% should be retained. The result of this analysis identified the critical factors for SQ, IQ, SVQ, and II. The research data were evaluated under CFA using the PLS method. The coefficient R^2 is 0.510 for the II endogenous latent variable. The preliminary observations indicated that SQ, IQ, and SVQ explain 51% of the variance in the II variable. The inner model indicated that SQ-Sophistication (0.264) has the strongest effect on II, followed by IQ-Usability (0.238), IQ-Output (0.204), IQ-Content, and Service Quality (0.108). After completing the bootstrapping, the results from the *T* statistics and the *p* values confirmed that IQ-Output, SQ-Sophistication, and IQ-Usability paths are statistically significant.

To add value to this research, the researcher investigated the relationships between SVQ and IQ-Output, IQ-content, IQ-Usability, SQ-Efficiency, SQ-Flexibility, SQ-

Sophistication, and SQ-System Features. The purpose of this test was to understand if SVQ influences users' perceptions of SQ and IQ. The result revealed that SVQ has a strong impact on users' opinions when evaluating SQ and IQ.

The researcher examined whether users' opinions are moderated be age, gender, experience, and position when evaluating the ERP systems. The result of the PLS-MGA indicated that UCs moderate the relationships between the independent and dependent variables. This study determined whether the relative importance of the IS factors differs between the research results in this study and the research results found in previous research. The results from both studies indicated that SQ and IQ moderate the II variable. However, this study found that SVQ does not support ERP users when evaluating ERP success. The study by Petter et al. (2008) found that SVQ moderates the II variable.

Following from the differences of results between this research and that of Petter et al. (2008), the result of this research is in agreement with the notion that Middle Eastern countries with high scores in UA and PD have a lower rate of IS success than countries with low UA and PD scores. One of the main reasons for this agreement was that this research concluded that users' perceptions of ERP success in the Middle East were different from users' perceptions of ERP success in more developed countries. Further research is needed to explore whether the difference in findings is actually related to the cultural difference between the Middle East and developed countries. This research bridged the gap in literature on the need to conduct ERP research in the Middle East.

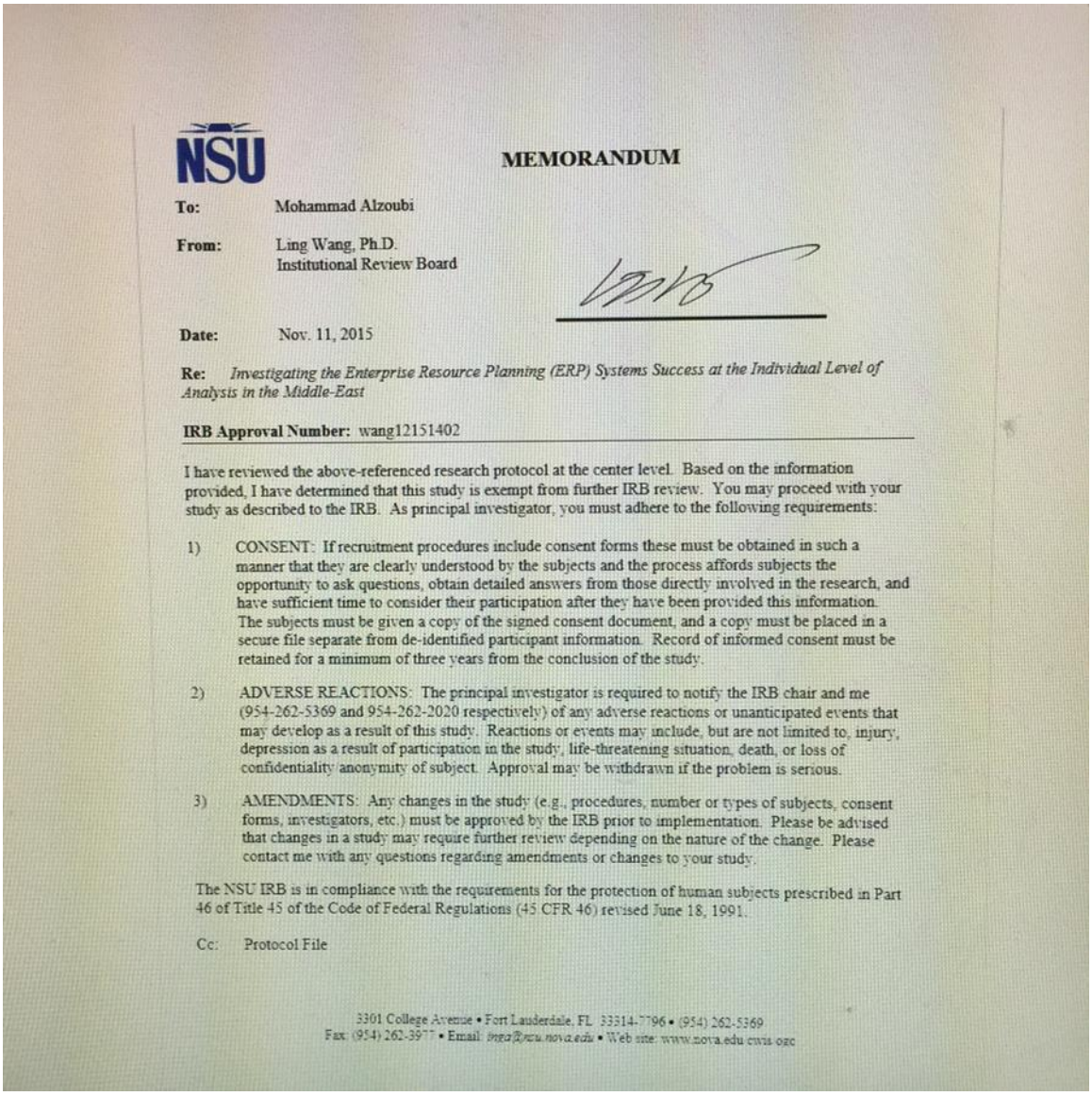
The result of this dissertation study is significant because the achieved results can be used to help organizations implement methods that could enhance users' performance and productivity in an ERP environment. Understanding the relative importance of end users'

success factors in an ERP system environment can help IT managers put more emphasis on the leading issues perceived by end users. The dissertation study contributed to the body of knowledge by highlighting the importance of SQ, IQ, and SVQ in impacting ERP users' learnability, awareness/recall, decision effectiveness, and individual productivity in an ERP environment. The results of this research can be used by ERP vendors to deliver an integrated and customized ERP system to organizations based on region.

Understanding differences of group-specific results for the UCs variables may help organizations in attracting talented employees to utilize their ERP systems. In addition, understanding the relationship between SVQ and SQ, and IQ may influence organizations to take actions to enhance the IS SVQ for the ERP users. This research also bridged the gap in literature on the need for ERP research in the Middle East.

Appendix A

IRB Approval Letter



NSU

MEMORANDUM

To: Mohammad Alzoubi

From: Ling Wang, Ph.D.
Institutional Review Board

Date: Nov. 11, 2015

Re: *Investigating the Enterprise Resource Planning (ERP) Systems Success at the Individual Level of Analysis in the Middle-East*

IRB Approval Number: wang12151402

I have reviewed the above-referenced research protocol at the center level. Based on the information provided, I have determined that this study is exempt from further IRB review. You may proceed with your study as described to the IRB. As principal investigator, you must adhere to the following requirements:

1) CONSENT: If recruitment procedures include consent forms these must be obtained in such a manner that they are clearly understood by the subjects and the process affords subjects the opportunity to ask questions, obtain detailed answers from those directly involved in the research, and have sufficient time to consider their participation after they have been provided this information. The subjects must be given a copy of the signed consent document, and a copy must be placed in a secure file separate from de-identified participant information. Record of informed consent must be retained for a minimum of three years from the conclusion of the study.

2) ADVERSE REACTIONS: The principal investigator is required to notify the IRB chair and me (954-262-5369 and 954-262-2020 respectively) of any adverse reactions or unanticipated events that may develop as a result of this study. Reactions or events may include, but are not limited to, injury, depression as a result of participation in the study, life-threatening situation, death, or loss of confidentiality/anonymity of subject. Approval may be withdrawn if the problem is serious.

3) AMENDMENTS: Any changes in the study (e.g., procedures, number or types of subjects, consent forms, investigators, etc.) must be approved by the IRB prior to implementation. Please be advised that changes in a study may require further review depending on the nature of the change. Please contact me with any questions regarding amendments or changes to your study.

The NSU IRB is in compliance with the requirements for the protection of human subjects prescribed in Part 46 of Title 45 of the Code of Federal Regulations (45 CFR 46) revised June 18, 1991.

Cc: Protocol File

3301 College Avenue • Fort Lauderdale, FL 33314-7796 • (954) 262-5369
Fax: (954) 262-3977 • Email: irga@nsu.nova.edu • Web site: www.nova.edu/cwis/ogc

Appendix B

Survey Items

Survey Participation Cover Page

You are being asked to participate in a research project conducted by Mohammad M. Alzoubi from the College of Engineering and Computing, Nova South-Eastern University. You are being asked to participate in the survey because you are an existing or a former user of an Enterprise Resource Planning System (ERPs). Please understand that participation in this study is completely voluntary. You also have the right to refuse to answer any question(s) for any reason, without penalty.

DISSERTATION TITLE: Investigating the Enterprise Resource Planning (ERP) Systems Success at the Individual Level of Analysis in the Middle-East.
PURPOSE: The purpose of this study is to understand your perception of the ERP system.
PARTICIPATION: You will be asked to answer the survey questions by selecting an answer from various options available in the survey. We expect your participation to take about ten to fifteen minutes of your time.
RISKS & BENEFITS: There may discomfort associated with time you will spend in answering the survey questions. We expect this research to benefit the field of information system by advancing knowledge.
COMPENSATION: None
CONFIDENTIALITY & PRIVACY: No identifying information will be collected during the study.
If you have any questions or would like additional information about this research, please contact the primary investigator at alzoubi@nova.edu. The NSU Institutional Review Board (IRB), has approved this project. You may also contact the IRB at lingwang@nova.edu with any questions.

Please indicate your consent to participate in this research by clicking **NEXT** below.

Section One: User's Charactaristics

*** 1. What is your gender?**

- ◯ Female
- ◯ Male

*** 2. What is your age?**

- ◯ 20 to 29
- ◯ 30 to 40
- ◯ >40

*** 3. How many years of experience do you have in using ERP system?**

- ◯ 1-3 Years
- ◯ 4-10 Years
- ◯ More than 10 Years

*** 4. What is your job level?**

- ◯ General Employee
- ◯ Middle Management
- ◯ Senior Management

*** 5. What is your level of education?**

- ◯ Associate Degree
- ◯ Bachelor's Degree
- ◯ Graduate Degree

Section Two: System Quality (SQ)

System Quality is a measure of the performance of the ERP system from a technical and design perspective.

*** 6. The ERP system is easy to use.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
SQ1	◯	◯	◯	◯	◯

*** 7. The ERP system is easy to learn.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
SQ2	◯	◯	◯	◯	◯

*** 8. The ERP system meets my requirements.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
SQ3	◯	◯	◯	◯	◯

*** 9. The ERP system includes the necessary features and functions**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
SQ4	○	○	○	○	○

*** 10. The ERP system always does what it should.**

	Strongly Disagree	Disagree	Undecided	Agree	strongly Agree
SQ5	○	○	○	○	○

*** 11. The ERP system can be easily adapted to one's personal approach.**

	Strongly Disagee	Disagree	Undecided	Agree	Strongly Agree
SQ6	○	○	○	○	○

*** 12. The ERP system is always up-and-running as necessary.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
SQ7	○	○	○	○	○

System Quality Cont

*** 13. The ERP system requires a minimum number of fields and screens to achieve a task.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
SQ8	○	○	○	○	○

*** 14. The data within ERP system is fully integrated and consistent.**

	Strongly Disagree	Disagree	Undecided	Agree	strongly Agree
SQ9	○	○	○	○	○

*** 15. The ERP system can be easily modified, corrected or improved.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
SQ10	○	○	○	○	○

*** 16. Data from the ERP often needs correction**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
SQ11	○	○	○	○	○

*** 17. Data from the ERP is current enough.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
SQ12	○	○	○	○	○

*** 18. It is often difficult to get access to information that is in The ERP system.**

	Strongly DIsagree	Disagree	Undecided	Agree	Strongly Agree
SQ13	○	○	○	○	○

*** 19. The ERP system responds quickly enough.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
SQ14	○	○	○	○	○

Section Three: Information Quality(IQ)

Information Quality is concerned with the quality of the IS outputs: namely, the quality of the information the system produces in reports and on-screen.

*** 20. Information available from the ERP system is important.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
IQ1	○	○	○	○	○

*** 21. Information from the ERP system is always available.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
IQ2	○	○	○	○	○

*** 22. Information from the ERP system is in a form that is readily usable.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
IQ3	○	○	○	○	○

*** 23. Information from the ERP system is easy to understand.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
IQ4	○	○	○	○	○

*** 24. The information provided by the ERP system is relevant.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
IQ5	○	○	○	○	○

Information Quality Cont

*** 25. Information from the ERP system appears readable, clear and well formatted.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
IQ6	○	○	○	○	○

*** 26. Though data from the ERP system may be accurate, outputs sometimes are not.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
IQ7	○	○	○	○	○

*** 27. Information from the ERP system is concise.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
IQ8	○	○	○	○	○

*** 28. Information from the ERP system is always timely.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
IQ9	○	○	○	○	○

*** 29. Information from the ERP system is unavailable elsewhere.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
IQ10	○	○	○	○	○

Section Four: Service Quality(SVQ)

Service Quality is the quality of the support that system users receive from the IS department and IT support personnel

*** 30. I receive prompt service from the IS department**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
SVQ1	○	○	○	○	○

*** 31. The Information I receive from the IS department is accurate.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
SVQ2	○	○	○	○	○

*** 32. The IS department delivers what they promise to deliver.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Disagree
SVQ3	○	○	○	○	○

*** 33. Training provided by the IS department improves my quality of work.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
SVQ4	○	○	○	○	○

*** 34. The IS department solves my problems on the system.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
SVQ5	○	○	○	○	○

Individual Impact (II)

Individual-Impact is concerned with how the ERP system has influenced your individual capabilities and effectiveness in the job.

*** 35. I have learnt much through the presence of the ERP system.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
II1	○	○	○	○	○

*** 36. The ERP system enhances my awareness and recall of job related information.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
II2	○	○	○	○	○

*** 37. The ERP system enhances my decision-making effectiveness at the job.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
II3	○	○	○	○	○

*** 38. The ERP system increases my productivity at the job.**

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
II4	○	○	○	○	○

Appendix C

Permission to Use a Research Model

Thank You For Your Order!

Dear Mr. Mohammad Alzoubi,

Thank you for placing your order through Copyright Clearance Center's RightsLink service. Palgrave Macmillan has partnered with RightsLink to license its content. This notice is a confirmation that your order was successful.

Your order details and publisher terms and conditions are available by clicking the link below:
http://s100.copyright.com/CustomerAdmin/PLF.jsp?ref=33be50f3-f9b9-493c-9190-47104d2e31c8

Order Details
Licensee: Mohammad Alzoubi
License Date: Nov 24, 2015
License Number: 3755430731623
Publication: European Journal of Information Systems
Title: Measuring information systems success: models, dimensions, measures, and interrelationships
Type Of Use: Thesis/Dissertation
Total: 0.00 USD

To access your account, please visit https://myaccount.copyright.com.

Please note: Online payments are charged immediately after order confirmation; invoices are issued daily and are payable immediately upon receipt.

To ensure that we are continuously improving our services, please take a moment to complete our customer satisfaction survey.

B.1:v4.2

+1-855-239-3415/Tel: +1-978-646-2777
customercare@copyright.com
http://www.copyright.com

Palgrave Macmillan LICENSE TERMS AND CONDITIONS

License Number	3755430731623
License date	Nov 24, 2015
Licensed content publisher	Palgrave Macmillan
Licensed content publication	European Journal of Information Systems
Licensed content title	Measuring information systems success: models, dimensions, measures, and interrelationships
Licensed copyright line	Copyright © 2008, Macmillan Publishers Ltd.
Licensed content author	Stacie Petter, William DeLone and Ephraim McLean
Licensed content date	Jun 1, 2008
Volume number	17
Issue number	3
Type of Use	Thesis/Dissertation
Requestor type	Student
The intended publisher of new work	n/a
Format	Electronic
Portion	chart/graph/table/figure
Number of charts/graphs/Tables/figures	1
Rights for	Main product
Duration of use	Life of current edition
Creation of copies for the disabled	no
With minor editing privileges	yes
For distribution to	United States
In the following language(s)	Original language of publication
With incidental promotional use	no
The lifetime unit quantity of new product	0 to 499
The requesting person/organization is:	Mohammad Alzoubi
Order reference number	None
Title of your thesis/dissertation	Evaluating the Enterprise Resource Planning (ERP) Systems Success at the Individual Level of Analysis in the Middle East
Expected completion date	Jun 2016
Expected size (number of pages)	130

Copyright Statement for the Survey Items

COPYRIGHT-Survey Items

Source:

Gable, G., Sedera, D., and Chan, T. (2008). Re-conceptualizing information system success: the IS-Impact Measurement Model. *Journal of the Association for Information Systems, 9*(7) 377–408.

Appendix D

Pilot Study Analysis

Pilot Study-SQ Reliability Statistics

Cronbach's Alpha	*N* of Items
.850	10

Pilot Study-SQ Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SQ1	34.1034	28.810	.556	.837
SQ2	34.2069	28.170	.587	.834
SQ3	34.0690	27.138	.710	.823
SQ4	34.1034	28.453	.522	.839
SQ5	34.1724	27.933	.635	.830
SQ6	34.4828	25.687	.621	.830
SQ7	34.4138	27.894	.528	.838
SQ8	34.5517	28.113	.420	.850
SQ9	34.2759	28.564	.401	.851
SQ10	34.2414	26.833	.625	.829

Pilot Study-SQ-Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squares Loadings			Rotation Sums of Squares Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.455	44.547	44.547	4.455	44.547	44.547	2.631	26.315	26.315
2	1.564	15.638	60.185	1.564	15.638	60.185	2.393	23.934	50.249
3	1.270	12.698	72.883	1.270	12.698	72.883	2.263	22.634	72.883
4	.980	9.805	82.688						
5	.602	6.024	88.712						
6	.401	4.015	92.727						
7	.310	3.102	95.828						
8	.216	2.165	97.993						
9	.109	1.093	99.086						
10	.091	.914	100.000						

Extraction Method: Principal Component Analysis.

Pilot Study-IQ Reliability Statistics

Cronbach's Alpha	*N* of Items
.852	10

Pilot Study-IQ Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
IQ1	33.4643	25.739	.560	.843
IQ2	33.9286	22.069	.631	.830
IQ3	33.8929	23.729	.696	.829
IQ4	33.8571	22.423	.649	.829
IQ5	33.6786	24.522	.497	.843
IQ6	33.8571	23.683	.662	.830
IQ7	34.2500	24.565	.344	.859
IQ8	34.2143	22.693	.647	.829
IQ9	34.2500	23.083	.555	.838
IQ10	34.3571	22.683	.491	.847

Pilot Study-IQ-Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squares Loadings			Rotation Sums of Squares Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.612	46.120	46.120	4.612	46.120	46.120	3.135	31.350	31.350
2	1.400	14.002	60.123	1.400	14.002	60.123	2.674	26.735	58.085
3	1.141	11.405	71.528	1.141	11.405	71.528	1.344	13.443	71.528
4	.728	7.275	78.803						
5	.650	6.501	85.304						
6	.497	4.972	90.276						
7	.446	4.457	94.734						
8	.274	2.743	97.476						
9	.176	1.758	99.234						
10	.077	.766	100.00						

Extraction Method: Principal Component Analysis.

Pilot Study-SVQ Reliability Statistics

Cronbach's Alpha	*N* of Items
.822	5

Item Statistics

	Mean	Std. Deviation	*N*
SVQ1	3.8276	.88918	29
SVQ2	3.7931	.90156	29
SVQ3	4.0000	.70711	29
SVQ4	3.8621	.87522	29
SVQ5	4.0000	.80178	29

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SVQ1	15.6552	6.805	.574	.800
SVQ2	15.6897	7.079	.493	.825
SVQ3	15.4828	6.830	.792	.745
SVQ4	15.6207	6.958	.549	.807
SVQ5	15.4828	6.616	.727	.755

Pilot SVQ-Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squares Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.021	60.413	60.413	3.021	60.413	60.413
2	.812	16.245	76.658			
3	.686	13.721	90.379			
4	.289	5.779	96.158			
5	.192	3.842	100.000			

Extraction Method: Principal Component Analysis.

Pilot Study II Reliability Statistics

Cronbach's Alpha	*N* of Items
.809	4

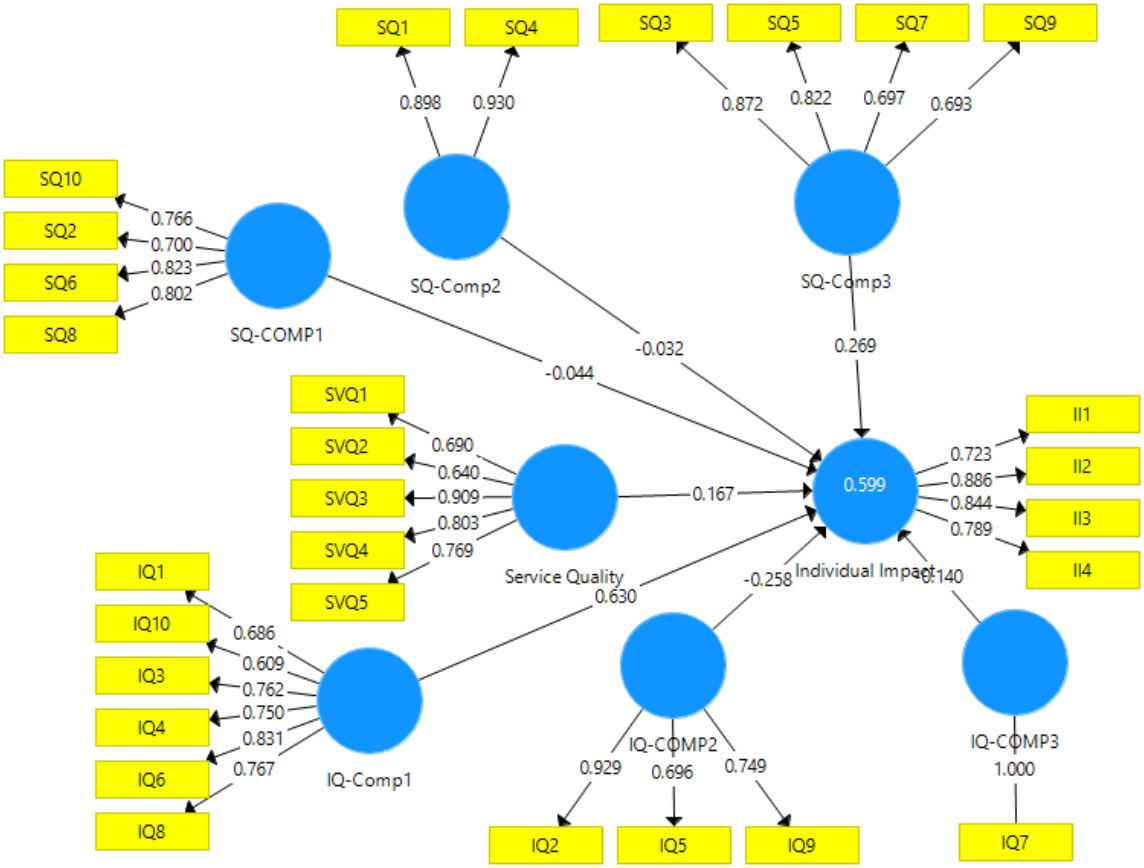
Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
II1	12.0357	2.999	.600	.820
II2	11.9643	4.110	.718	.734
II3	12.0714	3.772	.749	.708
II4	11.9286	4.365	.566	.790

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squares Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.689	67.235	67.235	2.689	67.235	67.235
2	.733	18.327	85.562			
3	.336	8.409	93.972			
4	.241	6.028	100.000			

Extraction Method: Principal Component Analysis.



Initial items for the pilot study

Average Variance Extracted (AVE)

	Average Variance Extracted (AVE)
IQ-Comp2	0.636
IQ-Comp3	1.000
IQ-Comp1	0.544
II	0.661
SQ-Comp1	0.599
SQ-Comp2	0.836
SQ-Comp3	0.600
Service Quality	0.590

Discriminant Validity

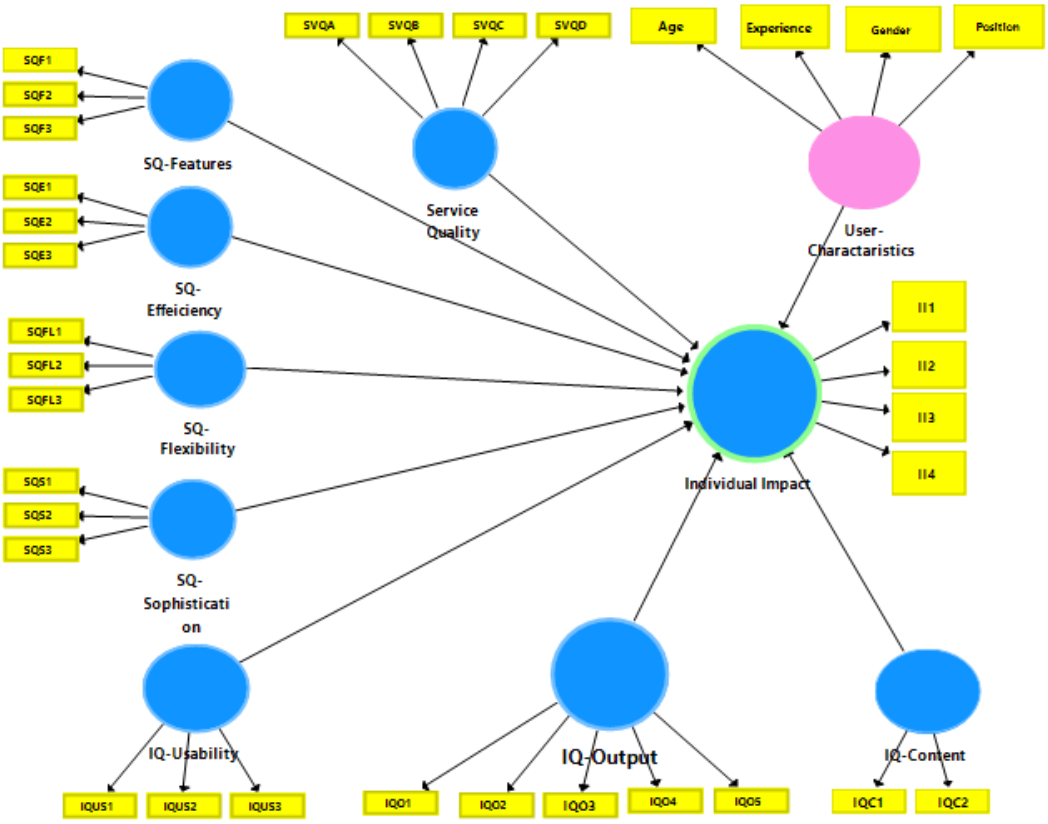
	Composite Reliability
IQ-Comp2	0.837
IQ-Comp3	1.000
IQ-Comp1	0.876
II	0.886
SQ-Comp1	0.856
SQ-Comp2	0.911
SQ-Comp3	0.856
Service Quality	0.876

Fornell–Larcker Criterion-Pilot Study

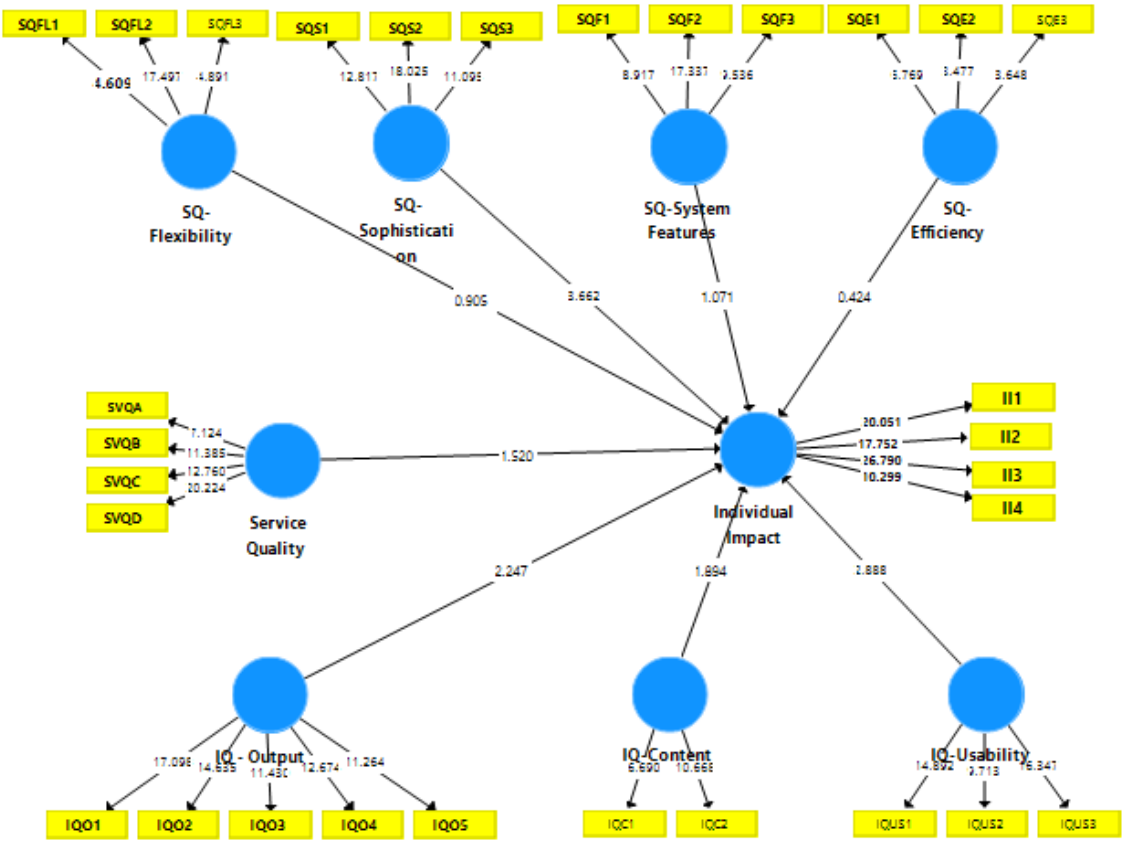
	IQ-Comp2	IQ-Comp3	IQ-Comp1	II	SQ-Comp1	SQ-Comp2	SQ-Comp3	Service Quality
IQ-Comp2	**0.797**							
IQ-Comp3	0.217	**1.000**						
IQ-Comp1	0.684	0.268	**0.738**					
II	0.387	0.032	0.714	**0.813**				
SQ-Comp1	0.408	0.604	0.627	0.369	**0.774**			
SQ-Comp2	0.304	0.187	0.382	0.293	0.314	**0.914**		
SQ-Comp3	0.639	0.255	0.775	0.638	0.499	0.519	**0.775**	
Service Quality	0.597	0.137	0.771	0.639	0.503	0.379	0.718	**0.768**

Appendix E

Main Study Analysis



Updated Research Model



Research Model. *T* values for the inner model and outer model

Case Processing Summary

		N	%
Cases	Valid	218	100.0
	Excluded[a]	0	.0
	Total	218	100.0

[a] Listwise deletion based on all variables in the procedure.

KMO and Bartlett's Test

Kaiser–Meyer–Olkin Measure of Sampling Adequacy.		.858
Bartlett's Test of Sphericity	Approx. Chi-Square	2389.567
	df	528
	Sig.	.000

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	*N* of Items
.903	.904	33

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum/ Minimum	Variance	*N* of Items
Item Means	3.546	3.046	3.911	.865	1.284	.040	33
Item Variances	1.200	.954	1.499	.545	1.571	.023	33

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
SQ1	113.4900	297.845	.484	.397	.900
SQ2	113.3524	307.663	.278	.280	.903
SQ3	113.4804	301.173	.425	.399	.901
SQ4	113.5038	296.220	.531	.422	.899
SQ5	113.5168	298.533	.481	.399	.900
SQ6	113.5764	301.656	.382	.433	.901
SQ7	113.4130	298.483	.499	.419	.899
SQ8	113.6873	300.804	.389	.364	.901
SQ9	113.4303	300.480	.473	.380	.900
SQ10	113.7289	303.019	.361	.364	.902
SQ11	113.9075	309.440	.196	.361	.904
SQ12	113.5267	302.577	.382	.311	.901
SQ13	113.9809	306.853	.234	.387	.904
SQ14	113.3853	296.911	.566	.499	.898
IQ1	113.2698	292.432	.582	.564	.898
IQ2	113.3079	299.551	.501	.556	.899
IQ3	113.4763	296.742	.539	.439	.899
IQ4	113.2607	301.403	.469	.457	.900
IQ5	113.3662	298.119	.505	.413	.899
IQ6	113.2423	296.491	.540	.416	.899
IQ7	113.8662	303.380	.314	.259	.903
IQ8	113.5895	300.997	.464	.445	.900
IQ9	113.4567	299.769	.459	.419	.900

IQ10	113.6076	304.910	.320	.393	.902
SVQ1	113.4016	302.937	.395	.451	.901
SVQ2	113.6598	300.042	.410	.448	.901
SVQ3	113.6320	299.419	.452	.461	.900
SVQ4	113.3983	299.816	.502	.350	.899
SVQ5	113.3983	298.994	.534	.479	.899
II1	113.2989	296.157	.522	.476	.899
II2	113.3059	297.128	.539	.500	.899
II3	113.2221	294.535	.599	.542	.898
II4	113.1155	301.512	.439	.420	.900

Descriptive Statistics

	N	Mean	**Skewness**		**Kurtosis**	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
SQ1	218	3.5367	–.789	.165	–.259	.328
SQ2	218	3.6743	–.639	.165	–.074	.328
SQ3	218	3.5463	–.713	.165	–.230	.328
SQ4	218	3.5229	–.713	.165	–.322	.328
SQ5	218	3.5099	–.624	.165	–.428	.328
SQ6	218	3.4503	–.635	.165	–.519	.328
SQ7	218	3.6138	–.772	.165	.020	.328
SQ8	218	3.3394	–.633	.165	–.579	.328
SQ9	218	3.5964	–.826	.165	.320	.328
SQ10	218	3.2978	–.269	.165	–.874	.328
SQ11	218	3.1193	–.301	.165	–.795	.328
SQ12	218	3.5000	–.622	.165	–.332	.328
SQ13	218	3.0459	–.276	.165	–1.051	.328
SQ14	218	3.6414	–.705	.165	–.058	.328
IQ1	218	3.7569	–1.053	.165	.193	.328
IQ2	218	3.7188	–.871	.165	.508	.328
IQ3	218	3.5505	–.949	.165	.295	.328
IQ4	218	3.7661	–.863	.165	.332	.328
IQ5	218	3.6606	–.917	.165	.233	.328
IQ6	218	3.7844	–.930	.165	.291	.328
IQ7	218	3.1606	–.356	.165	–.971	.328
IQ8	218	3.4372	–.801	.165	.123	.328
IQ9	218	3.5700	–.697	.165	–.239	.328
IQ10	218	3.4192	–.526	.165	–.331	.328
SVQ1	218	3.6251	–.878	.165	.313	.328

SVQ2	218	3.3670	–.627	.165	–.463	.328
SVQ3	218	3.3947	–.629	.165	–.435	.328
SVQ4	218	3.6284	–.743	.165	.045	.328
SVQ5	218	3.6284	–.720	.165	.004	.328
II1	218	3.7278	–.879	.165	.044	.328
II2	218	3.7209	–.892	.165	.254	.328
II3	218	3.8046	–1.053	.165	.668	.328
II4	218	3.9112	–1.151	.165	1.131	.328
Valid *N* (listwise)	218					

Construct Cross-validated Redundancy (BlindFolding)

Total

	SSO	SSE	Qï¿½ (=1–SSE/SSO)
IQ-Content	436.000	436.000	0
IQ-Output	1,090.000	1,090.000	0
IQ-Usability	654.000	654.000	0
II	872.000	644.339	**0.261**
SQ-Efficiency	654.000	654.000	0
SQ-Features	654.000	654.000	0
SQ-Flexibility	654.000	654.000	0
SQ-Sophistication	654.000	654.000	0
Service Quality	872.000	872.000	0

Formula for calculating the GoF is noted below.

$$\text{GoF} = \sqrt{Communality * R^2}$$

References

Abugabah, A., Sanzogni, L., & Poropat, A. (2009). The impact of information systems on user performance: A critical review and theoretical model. *Proceedings of the International Conference on Information Systems (ICIS),* 809–819.

Adelakun, O., & Jennex, M. (2002) Stakeholder Process Approach to information system evaluation, *Eighth Americas Conference on Information Systems,* 1186–1195**.**

Al-Fawaz, K., Eldabi, T., & Naseer, A. (2010). Challenges and influential factors in ERP adoption and implementation, *European, Mediterranean and Middle Eastern Conference on Information Systems,* Retrieved from: http://v-scheiner.brunel.ac.uk/bitstream/2438/4361/1/C84.pdf

Al-Mashari, M., & Zairi, M. (2000). Information and business process equality: The case of SAP R/3 implementation. *The Electronic Journal of Information Systems in Developing Countries*, *1*(4), 1–15.

Al-Mashari, M., Al-Mudimigh, A., & Zairi, M. (2003). Enterprise resource planning: A taxonomy of critical factors. *European Journal of Operational Research, 146,* 352–364.

Al-Turki, U. M. (2011). An exploratory study of ERP implementation in Saudi Arabia. *Production Planning & Control*, *22*(4), 403–413.

Argyropoulou, M., Sharma, M. K., Lazarides, T., Koufopoulos, D., & Ioannou, G. (2010). Measuring supply chain performance in SMEs in *The Handbook of Business and Information Management Systems*, eds. A. Gunasekaran, and M. Sandhu, Handbook of Business and Information Management Systems Advances in Information Resources Management book series, IGI Global, ISBN: 978-981-283-605-5.

Amaratunga, D., & Baldry, D. (2002). Moving from performance measurement to performance management, *Facilities, 20*(5/6), 217–223.

Amoako-Gyampah, K. (2007). Perceived usefulness, user involvement and behavioral intention: an empirical study of ERP implementation, *Computers in Human Behavior, 23*(3), 1232–1248.

Amoako-Gyampah, K., & Salam, A. F. (2004). An extension of the technology acceptance model in an ERP implementation environment. *Information & Management, 41*(6), 731–745.

Bai, H., & Cheng. J. (2010). The impact of organizational culture on ERP assimilation: The mediating role of user participation: *IEEE Explore.*

Bedworth, D. D., & Bailey, J. E. (1987). *Integrated production control systems* (2nd ed.). New York, NY: John Wiley & Sons.

Bingi, P., Sharma, M. K., & Godla, J. K. (1999). Critical issues affecting an ERP implementation. *Information Systems Management*, *16*(3), 7–14.

Botta-Genoulaz, V., & Millet, P. (2005). A classification for better use of ERP systems. *Computers in Industry, 56*, 573–587.

Calisir, F., & Calisir, F. (2004). The relation of interface usability characteristics, perceived usefulness, and perceived ease of use to end user satisfaction with enterprise resource planning (ERP) systems. *Computers in Human Behavior, 20*(4), 505–515.

Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin, 56*, 81–105.

Chang, H. H. (2008) Intelligent agent's technology characteristics applied to online auctions' task: A combined model of TTF and TAM, *Technovation, 28*(9), 564–577.

Chatterjee, S., & Hadi, A. S. (2006). *Regression analysis by example*. Hoboken, NJ: Wiley Interscience.

Chun-Chin, W., Tian-Shy, L., & Kuo-Liang, L. (2008) An ERP performance measurement framework using a fuzzy integral approach. *Journal of Manufacturing Technology Management, 19*(5), 607–626.

Caruso, D. (2009). Manufacturers: How ERP systems improve employee performance. Retrieved from http://www.microsoft.com/dynamics/en/gulf/industries/erp-performance.aspx

Chen, S.-G., & Lin, Y.-K. (2008). An Evaluation method for enterprise resource planning systems. *Journal of the Operations Research Society of Japan, 51*(4), 299–309.

Costello, A. B., & Osborne, J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation, 10*(7).

Creswell, J. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). Thousand Oaks, CA: Sage.

Davenport, T. (2000). The future of enterprise system-enabled organizations. *Information Systems Frontiers, 2*(2), 163–180.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 318–340.

DeLone, W. H., & McLean, E. R. (1992). Information systems success: The quest for the dependent variable. *Information Systems Research, 3*(1), 60–95.

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A ten-year update. *Journal of Management Information Systems, 19*(4), 9–30.

Dery, K., Hall, R., & Wailes, N. (2006). ERPs as 'technologies-in-practice': social construction, materiality and the role of organizational factors. *New Technology, Work and Employment, 21*(3), 229–241.

Dorfman, W. P., & Howell, P. J. (1988). Dimensions of national culture and effective leadership patterns: Hofstede revised. *Advances in International Comparative Management, 3*, 127–150.

Esteves, J., Pastor, J., & Casanovas, J. (2003). A goal/question/metric research proposal to monitor user involvement and participation ERP implementation projects. *Information Resources Management Association Conference (IRMA)*, Philadelphia, USA, 325–327.

Erumban, A., & Jong, S. (2006). Cross-country differences in ICT adoption: A consequence of culture? *Journal of World Business, 41*(4), 302–314.

Evans, J.R. and Mathur, A. (2005), 'The value of online surveys', Internet Research, 15, 2, 195–219.

Farbey, B., Land, F., & Targett, D. (1993) *How to assess your IT investment*. Oxford, UK: Butterworth-Heinemann Ltd.

Finston, S. K. (2007). Technology transfer snapshots from middle-income countries: creating socio-economic benefits through innovation. In: A. Krattiger et al. (Eds.), *Intellectual Property Management in Health and Agricultural Innovation*: *A Handbook of Best Practices*. Oxford: MIHR.

Field, A. (2005). *Discovering statistics using SPSS*. London: Sage Publications.

Fornell, C., Larcker, D.F., 1981. Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18 (1), 39-50.

Fowler, A., & Gilfillan, M. (2003). A framework for stakeholders integration in higher education information system projects. *Technology Analysis & Strategic Management, 15*(4), 467–489.

Fowler, F. J. (2002). *Survey research methods* (3rd ed.). Newbury Park, CA: Sage Publications.

Fowler, F. J., Jr. (2009). *Survey research methods* (4th ed.). Thousand Oaks, CA: Sage.

Gable, G., Sedera, D., & Chan, T. (2003). Enterprise systems success: a measurement model, *Twenty-fourth international conference of information systems,* 576–591.

Gable, G., Sedera, D., & Chan, T. (2008). Re-conceptualizing information system success: The IS-Impact measurement model. *Journal of the Association for Information Systems, 9*(15).

Goodhue, D. L. (1995). Understanding user evaluations of information systems, *Management Science, 41*(12), 1827–1844.

Goodhue, D. L., & Thompson, R. L. (1995). Task-technology fit and individual performance. *MIS Quarterly, 19*(2), 213–236.

Gunton, T. (1988). *Business Information Technology: End User Focus.* Upper Saddle River, NJ: Prentice-Hall, Inc.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2014). *A primer on partial least squares structural equation modeling (PLS-SEM).* Thousand Oaks, CA*:* Sage Publications, Inc.

Hatamizadeh, A., & Aliyev, A. (2011). Feasibility study of ERP implementation in Iran industry. *American Journal of Scientific Research, 35*, 68–77.

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. *Advances in International Marketing, 20*, 277–320.

Hofheinz, A. (2005). The Internet in the Arab World: Playground for Political Liberalization. *Internationale Politik und Gesellschaft*. ISSN 0945-2419. (3), 78-96

Hofstede, G. (1980). *Culture's consequences: International differences in work-related values*. Beverly Hills, CA: SAGE Publications.

Hofstede, G. (1983). Dimensions of national cultures in fifty cultures and three regions. In R. Goodwin (Ed.) *Personal relationships across cultures* (pp. 22–36). London: Routledge.

Hofstede, G. (1991). *Cultures and organizations: Software of the mind*. New York, NY: McGraw-Hill.

Hofstede, G. (2001). *Culture's consequences* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Hofstede, G., & Bond, M. H. (1988). The Confucius connection: From cultural roots to economic growth. *Organizational Dynamics, 16*(4), 5–21.

Holsapple M. P., Burns-Naas, L. A., Hastings, K., Ladics, G. S., Lavin, A. L., Makris, S., Yang, Y., & Luster, M. I. (2005). A proposed testing framework for developmental immunotoxicology (DIT). *Toxicological Sciences, 83*, 18–24.

Howcroft, D., Newell, S., & Wagner, E. (2004). Understanding the contextual influences on enterprise system design, implementation, use and evaluation. *Journal of Strategic Information Systems, 13*(4), 271–277.

Hsu, L., Lai, R., & Weng, Y. (2008). Understanding the critical effect user satisfaction and impact of ERP through innovation of diffusion theory. *International Journal of Technology Management, 43*(1–3), 30–47.

Ifinedo, P., & Nahar, N. (2007). ERP systems success: an empirical analysis of how two organisational stakeholder groups prioritize and evaluate relevant measures. *Enterprise Information Systems, 1*(1), 25–48.

Iskanius, P. (2010). Risk management of ERP projects in manufacturing SMEs. *Information Resources Management Journal, 23*(3), 60–75.

Islam, R., & Rasad, S. (2005) Employee performance evaluation by AHP: a case study. *Asia Pacific Management Review, 11*(3), 163–176.

Janardhan, N. (2011). UAE's development strategy. Retrieved from https://jime.ieej.or.jp/htm/english/2011/0527.htm

Jones, S. (2008). Social dimension of IT/IS evaluation : Views from the public sector. In Z. Irani & P. Love (Eds.), *Evaluating information systems: Public and private sector* (pp. 236–256). Hungary: Butterworth-Heinemann.

Kalakota, R., & Robinson, M. (2001). *E-business 2.0: Roadmap to success*. Reading, MA: Addison-Wesley.

Koch, C. (2011). A status on enterprise resource planning (ERP) studies in information systems research. In *Computer and Information Science (ICIS), IEEE/ACIS 10th International Conference,* 409–414.

Kositanurit, B., Ngwenyama, O., & Bryson, K.-M. (2006). An exploration of factors that impact individual performance in an ERP environment: an analysis using multiple analytical techniques. *European Journal of Information Systems, 15,* 556–568.

Kujala, S. (2008). Effective user involvement in product development by improving the analysis of user needs. *Behaviour & Information Technology, 27*(6), 457–473.

Kujala, S., Kauppinen, M., Lehtola, L., & Kojo, T. (2005). The role of user involvement in requirements quality and project success. In *Proceedings of 13th IEEE Requirements Engineering Conference,* IEEE Computer Society Press, pp. 75–84.

Kwak, Y., Park, J., Chung, B., & Ghosh, S. (2012). Understanding end-users' acceptance of enterprise resource planning (ERP) system in project-based sector. *Engineering Management, IEEE Transactions, 59*(2), 266–277.

Law, C., Chen, C., & Wu, B. (2010). Managing the full ERP life cycle: Considerations of maintenance and support requirements and IT governance practice as integral elements of the formula for successful ERP adoption. *Computers in Industry, 61*, 297–308.

Lazar, J. (2006). *Web usability: a user-centered design approach*. Addison-Wesley.

Leidner, D. E., & Kayworth, T. (2006). Review: A review of culture in information systems research: Toward a theory of information technology culture conflict. *MIS Quarterly, 30*(2), 357–399.

Levi, S., & Doron, T. (2013). Critical success factors in enterprise resource planning systems: Review of the last decade. *Communications of the ACM, 45*(4).

Levy, Y., & Ellis, T. J. (2006). A system approach to conduct an effective literature review in support of information systems research. *Informing Science, 9*, 181–212.

Lin, C., Singer, R., & Ha, L. (2010). Why do university members use and resist technology? A structure enactment perspective. *Journal of Computing in Higher Education, 22*(1), 38–59.

Mahmood, M., Burn, J., Gemoets, L., & Jacquez, C. (2000). Variables affecting information technology end user satisfaction: a meta-analysis of the empirical literature. *International Journal of Human-Computer Studies, 52*, 751–771.

Markus, M. L., & Tanis, C. (2000). The enterprise systems experience: From adoption to success. In R. W. Zmud (Ed.). *Framing the domains of IT research: Glimpsing the future through the past*. Cincinnati, OH: Pinnaflex Educational Resources.

McCoy, S., Galletta, F., & King, R. (2007). Applying TAM across cultures: The need for caution. *European Journal of Information Systems, 16*(1), 81–90.

McGinnis, T., & Huang, Z. (2007). Rethinking ERP success: A new perspective from knowledge management and continuous improvement. *Information & Management, 44*, 626–634.

Mertler, C. A., & Charles, C. M. (2011). *Introduction to educational research* (7th ed.). Boston, MA: Pearson.

Monk, E., & Wagner, B. (2008). *Concepts in enterprise resource planning* (3rd ed.). Boston, MA: Thompson Course Technology.

Muscatello, J., & Chen, I. (2008). Enterprise resource planning (ERP) implementations: Theory and practice. *International Journal of Enterprise Information Systems, 4*, 63–77.

Nah, F. F.-H., Tan, X., & Beethe, M. (2005). An emergent model of end users' acceptance of enterprise resource planning systems: a grounded theory research. *Proceedings of the Americas Conference on Information Systems*, 2053–2057.

Ng, C., Gable, G., & Chan, T. (2002). An ERP-client benefit-oriented maintenance taxonomy. *The Journal of Systems and Software, 64*(2), 87–109.

Nicolaou, A., & Bhattachanya, S. (2008). Sustainability of ERPs performance outcomes: The role of postimplementation review quality. *International Journal of Accounting Information Systems, 9*, 43–60.

Pallant, J. (2007). *SPSS survival manual: step-by-step guide to data analysis* (3rd ed.). Australia: Allen & Unwin.

Panorama. (2010). ERP report. Denver, CO: Panorama Consulting Group.

Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage.

Panko, R. R. (1988). *End user computing: Management, applications, & technology.* New York, NY: John Wiley & Sons, Inc.

Peng, G. C., & Nunes, M. B. (2009). Surfacing ERP exploitation risks through a risk ontology. *Industrial Management & Data Systems, 109*, 926–942.

Peslak, A. R., & Boyle, T. A. (2010). An exploratory study of the key skills for entry-level ERP employees. *International Journal of Enterprise Information Systems, 6*(2), 1–14.

Petter, S., DeLone, W., & McLean, E. (2008). Measuring information systems success: Models, dimensions, measures, and interrelationships. *European Journal of Information Systems, 17*, 236–263.

Pinsonneault, A., & Kraemer, K. (1993). Survey research methodology in management information systems. *Journal of Management Information Systems, 10*(2), 75–105.

Preece, J., Rogers, Y., & Sharp, H. (2002). *Interaction design: Beyond human-computer interaction*. New York, NY: John Wiley & Sons.

Rabaa'i, A. A. (2009). The impact of organisational culture on ERP systems implementation: Lessons from Jordan. In *Proceedings of the Pacific Asia Conference on Information Systems.*

Ramdani, B. (2012). Information technology and organisational performance: Reviewing the business value of IT literature. In *Information Systems Theory* (pp. 283–301). New York, NY: Springer.

Ringle, C., Sarstedt, M., Schlittgen, R. (2014). Genetic algorithm segmentation in partial least squares structural equation modeling. *OR Spectrum, 36*(1), 251–276.

Rogers, E. (1983). *Diffusion of innovations*. New York, NY: Free Press.

Rovai, A. P., Baker, J. D., & Ponton, M. K. (2013). *Social science research design and statistics: A practitioner's guide to research methods and IBM SPSS analysis*. Chesapeake, VA: Watertree Press.

Salkind, N. J. (2009). *Exploring research* (7th ed.). Upper Saddle River, NJ: Pearson Education.

Salim, A., Suleiman. I., Salisu, G. (2015). Enterprise resource planning (ERP) systems in the banking industry: Implementations approaches, reasons for failures and how to avoid them. *Journal of Computer Sciences and Applications, 3*(2), 29–32.

Salmeron, J., & Lopez, C. (2010). A multi-criteria approach for risks assessment in ERP maintenance. *Journal of Systems and Software, 83*, 1941–1953.

Sayegh, R. D. (2010). *Factors affecting the implementation of ERP systems in organisations in the U.A.E*. Retrieved from http://bspace.buid.ac.ae/bitstream/handle/1234/274/90038.pdf?sequence=1.

Shang, S., & Seddon, P. (2000). A comprehensive framework for classifying the benefits of ERP systems. *Proceedings of the Americas Conference on Information Systems*, Long Beach, CA.

Singleton, R., & Straits, B. (2010). *Approaches to social research* (5th ed.). New York, NY: Oxford University Press.

Soja, P., & Paliwoda-Pękosz, G. (2013). Impediments to enterprise system implementation over the system lifecycle: contrasting transition and developed

economies. *The Electronic Journal of Information Systems in Developing Countries, 57*(1), 1–13.

Soltani, S., Elkhani, N., & Bakri, A. (2013). How Consultant Participation Lead to ERP Implementation Satisfaction : A study Upon the Iranian Industries, 10(2), 313–323

Spathis, C., & Ananiadis, J. (2005). Assessing the benefits of using an enterprise system in accounting information and management. *Journal of Enterprise Information Management, 18*(2), 195–210.

Stockdale, R., & Standing, C. (2006). An interpretive approach to evaluating information systems: A content, context, process framework. *European Journal of Operation Research, 173*(3), 1090–1102.

Straub, D., Boudreau, M. C., & Gefen, D. (2004). Validation guidelines for IS positivist research. *Communications of the Association for Information Systems, 13,* Article 24.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston: Allyn and Bacon.

Talet, N., & Alwahaishi, S. (2011). The relevance cultural dimensions on the success adoption and use of IT. *Third International Conference on Advanced Management Science*. IPEDR, *19,* Singapore: IACSIT Press.

Tenenhaus, M., Vinzi, V. E., Chatelin, Y.-M., & Lauro, C. (2005). PLS path modeling. *Computational Statistics and Data Analysis, 48*(1), 159–205.

Tsai, W. H., Chen, S. P., Hwang, E. T., & Hsu, J. L. (2010). A study of the impact of business process on the ERP system effectiveness. *International Journal of Business and Management, 5*(9), 26–37.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science, 46*(2), 186–204.

Velcu, O. (2010). Strategic alignment of ERP implementation stages: An empirical investigation. *Information & Management*, 47(3), 158-166.

Wang, X., & Huang, J. (2006). The relationships between key stakeholders' project performance and project success: perception of Chinese construction supervising engineers. *International Journal of Project Management, 24*, 253–260.

Wei, C., Liou, T., & Lee, K. (2008). An ERP performance measurement framework using a fuzzy integral approach. *Journal of Manufacturing Technology Management, 19*, 607–626.

Wetzels, M., Odekerken-Schröder, G., & Van-Oppen, C. (2009). Using PLS path modeling for assessing hierarchical construct models: Guidelines and empirical illustration. *MIS Quarterly*, *33*(1), 177–195.

Wieder, B., Booth, P., Matolcsy, Z., & Ossimitz, M. L. (2006). The impact of ERP systems on firm and business process performance. *Journal of Enterprise Information Managements*, *19*(1), 13–29.

Willis, T., & Willis-Brown, A. (2002). Extending the value of ERP. *Industrial Management & Data Systems, 102*, 35–38.

Wong, K. K. K. (2013). Partial least squares structural equation modeling (PLS-SEM) techniques using SmartPLS. *Marketing Bulletin, 24*, 1–32.

Woo, S. H. (2007). Critical success factors for implementing ERP: the case of a Chinese electronics manufacturer. *Journal of Manufacturing Technology Management, 18*(4), 431–442.

Wu, J., & Wang, Y. (2006). Measuring ERP success: The ultimate users' view. *International Journal of Operation and Production Management, 26*(8), 882–903.

Wu, J. H. & Wang, Y. M. (2007). Measuring ERP success: the key-users' viewpoint of the ERP to produce a viable IS in the organization. *Computers in Human Behavior*, *23*, 1582–1596.

Yin, R. (2009). *Case study research: design and methods* (5th ed.). London: SAGE Publications Ltd.

Zaglago, L., Apulu, I., Chapman, C., & Shah, H. (2013). The impact of culture in enterprise resource planning system Implementation. *Proceedings of the World Congress on Engineering.*

Zeng, Y., Lu, Y., & Skibniewski, M. (2012). Enterprise resource planning systems for project-based firms: Benefits, costs and implementation challenges. *Journal for the Advancement of Performance Information and Value, CIB, ISSN 1941-191.*

Zhang, L., Lee, M. K. O., & Zhang, Z. (2002). Critical success factors of enterprise resource planning systems, implementation success in China. *Proceedings of the 36th Hawaii International Conference on System Sciences*.

Zhang, Z., Lee, M. K. O., Zhang, L., & Huang, X. (2005). A framework of ERP systems implementation success in China: An empirical study. *International Journal of Production Economics, 98*(1), 56–80

Zhu, Y., Li, Y., Wang, W., & Chen, J. (2010). What leads to postimplementation success of ERP? An empirical study of the Chinese retail industry. *International Journal of Information Management, 30*(3), 265–276.

Zviran, M., Pliskin, N., & Levin, R. (2005). Measuring user satisfaction and perceived usefulness in the ERP context. *Journal of Computer Information Systems,* 43–52.