The Effect of ERP System Implementation on the Aspects of Service Quality: An empirical study on the Egyptian Telecommunications Sector

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Abstract

The goal of this research is to explore the effect of the ERP system implementation on some aspects of service quality in the Egyptian telecommunications organizations. The results of the research implied that there is significant impact of ERP system implementation on some aspects of service quality model that include tangible aspects of service, reliability and assurance.

Keywords:

Enterprise Resources Planning, Service quality, Critical Success Factors, Tangible Aspects, Reliability and Assurance

ملخص البحث :

تهدف هذه الدراسة الى اكتشاف اثر تطبيق نظام تخطيط موارد المشروع على بعض عناصرجودة الخدمة في شركات الاتصالات المصرية. وتوصلت الدراسة الى وجود علاقة ذات دلالة احصائية لتطبيق نظام تخطيط موارد المشروع و بعض عناصر جودة الخدمة المتمثلة في الجوانب الملموسة للخدمة والاعتمادية وتأكيد جودة الخدمة.

مفتاح الكلمات :

نظام تخطيط موارد المشروع – جودة الخدمة – عوامل النجاح الحرجة – الجوانب الملموسة للخدمة – الاعتمادية – تأكيد جودة الخدمة.

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Introduction

The successful implementation of ERP system in the telecom
sector as a management tool requires deep understanding of the
factors that contribute to that success. It is noted that there is a
debate in the literature regarding to determining The ERP
implementational success factors and the consequences associated
with that successful implementation.

Also, there might be a potential barrier before, during and after
the implementation process that should be taken into consideration
when studying ERP in Egypt and particularly in the
telecommunications sector. There is an absence of a theoretical
framework that could explain the experience of ERP implementation
in the telecommunications companies in Egypt. Also, the
consequences of the successful implementation of the ERP system is
still controversial because of the different results of many studies
that have tried to investigate the impact of different factors on
different business aspects including the quality dimensions. This
study is empirically exploring some of ERP implementational
factors in the telecommunications sector in Egypt, identifying the
service quality dimensions as well in an attempt to fill the gap in the
little knowledge that exists concerning the effect of ERP system
implementational factors on the service quality dimensions in the
telecom sector in Egypt using the service quality model.

The Theoretical framework of Research

In this part of research, the inductive approach will be implemented
by presenting the main terminologies and concepts of the study and
reviewing the literature and the related previous studies.

Terminologies and basic concepts:

This part presents the main concepts that is used in the study as follows:

ERP system

According to El Masbahi and Semma, (2013, p.99), ERP can be defined as a system for managing the company's resources (financial, material, and human) using a software package through focusing on consistency of information & communication between different business actors.

Critical success factors

Giving special and continual attention to specific elements in the management or enterprise area in order to achieve high performance & ensure the success of an organization (Boynlon, A.C., and Zmud, R.W. 1984, p.3)

Quality of Service

Parasuraman et al., (1988, p.199) have defined service quality as the difference between perceptions and expectations of performance.

Service quality dimensions:

Lehtinen and Lehtinen (1982) have divided service quality into ten dimensions that are used by the customers to evaluate the service quality. These dimensions are: tangibles, reliability, responsiveness, communication, credibility, security, competence, courtesy, understanding/knowing the customer, and access. Then the ten items were revised into specific dimensions such as:

Tangible aspects of service quality: (the physical elements of service such as uniform of personnel, instruments and physical facilities).

Reliability of service quality: (the ability to perform the committed service dependably and accurately).

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Assurance of service quality: (the ability to inspire confidence,
awareness, understanding and friendliness of employees).

Previous Studies

No.	Title	Researcher	Y Year	Aim and Application	Results
1.	Service Quality Gaps in Cellular Telecommunication Service Providers (A study with reference to – Andhra Pradesh)	*Kumar, V., Kolla, N., and Adinarayana*	2014	This study is applied on 412 of cellular telecommunications service providers in India This study aims to measure Service Quality using SERVQUAL model	The study indicated that cellular telecom competition was mainly based on service quality so in wining competition they need to consider the service quality gaps & all dimensions have service quality gaps but it was serious in responsiveness followed by assurance, tangibles, empathy and reliability.

| 2. | Priority of Key Success Factors (KSFS) on Enterprise Resource Planning (ERP) System Implementation Life Cycle | Hasibuan, Z., and Dantes, G. | 2012 | This study is applied on 74 companies that apply the ERP system from 37 companies representing 10 different industrial sectors.

The study aims to determine the critical success factors from twenty factors selected from the ERP literature based on a proposed five ERP's life cycle: Project Preparation, technology selection, project formulation Stage, implementation and development Stage. | The study showed that the success of the ERP system implementation can be measured through five indicators: system quality, information quality, service quality, tactical impact & strategic impact. Also, the study revealed that comm. was the most critical success factor at project preparation stage while the strong ERP product (package selection) is the most critical success factor on technology selection stage, the change management is the most critical success factor on project formulation stage, while user training is the most critical in the implementation /development stage. |

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Statement of the Problem

The research problem can be summarized into the following question:

1. What is the impact of ERP system critical success factors on service quality dimensions in the Egyptian telecommunications organizations?

   The previous question is divided into the following:

   1.1 What is the impact of ERP system critical success factors on tangible aspects of service quality in the Egyptian telecommunications organizations?

   1.2 What is the impact of ERP system critical success factors on reliability of service quality in the Egyptian telecommunications organizations?

   1.3 What is the impact of ERP system critical success factors on assurance of service quality in the Egyptian telecommunications organizations?

Research Methodology:

There is an absence of theory that can define the relationship between the ERP implementation and service quality in this research, therefore, the researcher is trying to explore this type of relationship to reach or build a theory and this could be attained through implementing an inductive approach using research questions by moving from the specific to general then using deductive approach to identify the ERP implementational critical success factors in the Egyptian telecommunications sectors and exploring the impact of these factors on some dimensions of SERVQUAL model.

Research Variables

In this research, there are two main variables that are divided into dependent and independent variables as follows:

1. The ERP implementational critical success factors that are divided into three categories: organizational, human and technological factors which represent the independent variables.

2. The Service Quality Dimensions: empathy, responsiveness and results of service quality which represent the dependent variables.

Research hypotheses

The following hypotheses have been developed in order to explore if there is a significant relationship between the ERP implementation and the quality of the service in the Egyptian Telecommunications sector:

H1: There is a significant impact of ERP system critical success factors on service quality dimensions in the Egyptian telecommunications organizations.

H1.1 There is a significant impact of ERP system critical success factors on tangible aspects of service quality in the Egyptian telecommunications organizations.

H1.2 There is a significant impact of ERP system critical success factors on reliability of service quality in the Egyptian telecommunications organizations.

H1.3 There is a significant impact of ERP system critical success factors on assurance of service quality in the Egyptian telecommunications organizations.

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Research Population and Sampling

The four Egyptian telecommunications organizations working in the telecommunications industry in Egypt are: Vodafone- Orange (Mobinil) - Etisalat and Telecom Egypt represent the population of the study. The first three organizations belong to the private sector while the last one is a shareholding organization.

The reason behind choosing the telecom sector is the extensive use of information technology, particularly, the ERP systems compared to some other Egyptian manufacturing and service sectors. The adoption of the updated IT and the ICT infrastructure plays a vital role in ERP implementation in large organizations and that relies on ERP systems as their backbone infrastructure for their functionalities (Abdelghaffar and Abdel Azim ,2010) which could be found in the telecom sector. from five-point Likert scale.

Two samples were drawn from the previous four service providers. The first has been drawn from the employees who use the ERP system in the four organizations. The second represents the customers who use the telecom services such as mobile calls and the internet. The number of the ERP users and customers in the four telecom operators was determined according to:

- The Annual Report of Egyptian telecom and IT sector indicators in 2014 that was issued by Ministry of Communication and Information Technology (MCIT).
- The Annual Bulletin of the Egyptian telecommunications sector (CAPMAS) the Central Agency for Public Mobilization and Statistics in 2016.
- The Mobile QoS Monthly Report in 2016 issued by the National Telecom Regulatory Authority (NTRA)

- The official websites of the four telecom operators in 2017:

Company Name	No. of Employees	No. of customers (in million)
Vodafone	9000	39.54
Etisalat	3000	22
Orange (Mobinil)	2000	33.7
Telecom Egypt	10000	11
Total	24000	106.24

Table (2): The telecom operator's employees and customers

According to Alsayed & Mostafa (2003), the mathematical equations are used to calculate the sample size are as follows:

A- Employees' sample size

$$n = \frac{N}{(N - 1)\, e^2 + 1}$$

Where: n: sample size   N: Population size   e: level of accepted error

$$n = \frac{24000}{(24000 - 1)\,(0.05)^2 + 1}$$

n = 393   number of respondents 707

B- Customers' sample size: (Alsayed & Mostafa 2003)

$$n = \frac{106.24 \text{ million}}{(106.24 \text{ million} - 1)\,(0.05)^2 + 1}$$

n = 400

number of respondents = 2880

Research Limitations
This study is implemented under a group of limitations as follows:
1. The study has application limitations including:

- This study is limited to the application of the ERP system in the service sector and particularly in the telecommunications industry in Egypt.
- The service quality evaluations in this study is limited to some of the dimensions of SEVQUAL model.

2. The study has a time limitation by which the data are collected at specific point of time as the data is collect through cross-section research design.

3. The study is geographically limited to specific areas including: Cairo, Giza, 6th of October City (smart village), Mansoura, Behera, El Mahalla El Kubra, Alexandria, Minya, Sohag and Damietta.

Literature Review

Historical Evolution of ERP system

According Nazemi, E., Tarokh, M., & Djavanshir, G., (2012), "ERP: A literature survey, International Journal of Advanced Manufacturing Technology, London, pp. 999-1018, The Material Requirement Planning (MRP) and the Manufacturing Resource Planning MRP II systems of the 1970s and 1980s respectively were the origin of ERP.In Egypt, the military sector was the first sector in Egypt that has implemented the Material Requirement Planning (MRP) system in 1970's then followed by the implementation of the Manufacturing Resource Planning (MRPII) in the same sector (Rasmy ,Tharwat, and Elsawah ,2005). After that, the multinational vendors including Oracle & SAP started to present the ERP to the Egyptian market in 1990's (Oracle & SAP). According to McGaughey and Gunasekaran, (2009), the evolutionary history of ERP and related systems are as follows:

System	Primary business need(s)	Scope	Enabling technology
MRP	Efficiency	Inventory Mgt. and prod. planning and control.	Mainframe computers, batch processing, traditional file systems.
MRP11	Efficiency, effectiveness and integration of manufacturing systems	Extending to the entire manufacturing firm (becoming cross functional)	Mainframe and mini computers, real-time (time sharing) processing, database management systems (relational)
ERP	Efficiency (primarily back office), effectiveness and integration of all organizational systems.	Entire organization (increasingly cross functional), including manufacturing operations	Mainframe, mini and macro computers, mainframe networks with distributed processing and databases, data warehousing and mining knowledge management
ERP11	Efficiency, effectiveness and integration within and among enterprises.	Entire org. extending to other org. (cross function and cross enterprise – partners, suppliers, etc.)	Mainframes, client server systems, distributedcomputing, knowledge management, internet technology (includes web service, intranets and extranets)

Table (3): The evolutionary history of ERP and related systems, source: Ronald E. McGaughey, and Angappa Gunasekaran, (2009), "Evolution of Enterprise Resource Planning, Global Implications of Modern Enterprise Information Systems Technologies and Applications, USA

But Gore, (2008, p.37), provided that ERP can be distinguished further as first, second and third generation based on the methodologies to support the ERP systems implementation that remain vital as follows:

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Particulars	First Generation ERP	Second Generation ERP	Third Generation ERP
Scope	Single company	Single company	Multiple companies
No. of Sites	Single	Multiple	Multiple sites from different companies
Methodology Focus	Streamline business processes	Global integration of enterprise	Integration of supply chain
Technology Focus	Business process efficiency	Interoperability across the globe	Interoperability across platforms
Organization Focus	Business process	Seamless integration across multiple sites	Product/Market channel
Process Focus	Enterprise- wide closed loop	Global enterprise-wide closed loop	E-business, SCM, CRM loop

Table (4): ERP Generations, Source: Gore, A., (2008), "Exploring the Competitive Advantage through ERP systems, Academic dissertation, the University of Oulu, Linnanmaa.p.37

Implementation of the ERP system

The number of ERP modules in some ERP system vendors such as Odoo could be reached to 300 modules. But there are basic ERP modules that are essentially implemented by the large ERP providers, these modules are: HR, accounting, finance, inventory, marketing, sales & operations.

Yeh, Yang and Lin (2007, p.848) conclude that there are many ERP modules such as a customer relationship management module, supply chain management module; an applied technology module; an enterprise strategy module; a financial accounting module; a financial control module; a project management module; a quality management module; a production planning/control module; a personnel/human resources module; a materials management module; a sales management module.

Erasmus & Daneva (2015,p.129) used the QFD (quality function deployment) approach for ERP design and implementation by establishing the architecture of the ERP system on the relationship between the QR (Quality Requirements) (Kazman et al,1998,p,127) and FR (Functional Requirements) & raking the quality requirements (prioritized qualities) that the end user & customer require in a four stage process that include: customer requirements, scope formulation, estimation and validation, then adopt and customize the ERP architecture in such a way that meets the technical needs and the prioritized qualities.

ERP Critical Success Factors of Implementation

In ERP literature, a group of critical success factors exist and this research will follow the framework proposed by Salaheldin, (1998) in classifying the success factors of MRP into: organizational, technological and human factors as follows:

A. Organizational critical success factors

1. Vision, Goals, Objectives and Business Plan

(Curko, K., Stepanic, D., and Varga, M., 2012, p.25), (Yaghubi, S., Modiri, N., and Rafighi, M., 2014, p.2), (Rouhani, S., and Ravasan, A., 2013).

2. Change Management

(Nah, F., and Delgado, S. ,2006, p.138), (AL-Ghamdi, A. ,2013), (Nah, F., and Lau, J., 2001, p.146).

3. Coordination, Cooperation and Cross-Functional Cooperation
(Akkermans, H., and van Helden, K. 2002, p.5).

4. Time, Cost of Implementation, Project Justification Based on Cost and Economic Scale
(Wu, J., 2007, p.741), (Al-Mashari, Majed., Al-Mudimigh, Abdullah, Zairi and Mohamed 2003, p.5).

5. Culture, Communication, Support and Empowerment
(Bhatti, T.R., 2002), (Ganesh, Mehta and Arpita, 2010, Seo and Goeun, 2013, p.498)

6. Project Management
(Nah, F.F-H., Lau, J.L-S. and Kuang, J., 2001, Umble E.J, Haft RR and Umble MM, 2003), (Woo, H. S. 2007, p. 24), (Collis, J. and Hussy, R., 2003, p.4).

7. Stakeholder's Management and Communication

(Akkermans, H., and van Helden, K. 2002, p.1)

8. Improved Work Efficiency
(Arabi, M., Saman, M., Wong, K., Beheshti, H., Za-kuan, N., 2011, p.156)

9. Implementation Strategy and Time Frame

(Gandhi, A., 2015, p. 42), (Bhagwani, A., 2009, p.17)

10.Business Process Re-engineering

(Nah, F.F-H., Lau, J.L-S. and Kuang, J., 2001, p.6), (Matende, S., and Ogao, P. 2013, p.521), (Abdelghaffar, H., Hamdy, R., and Abdel Azim, 2010, p 25),

B. Human critical success factors

1. Support from Top Management

(Al-Fawaz, K., Al-Salti Z., and Eldabi, T.,2008), (Finney, Sherry, Corbett, and Martin, 2007, p.335),

2. User's knowledge

(Arabi, M., Saman, M., Wong, K., Beheshti, H., Za-kuan, N., 2011, p.156).

3. Employee Moral

(Ganesh, Mehta and Arpita, 2010, p.76), (Belkhamza, Z., and Wafaa, S. 2012, p.213)

4. Training, Education and Job Redesign

(Finney, Sherry, Corbett, and Martin, 2007, p.88), (Swaminathan, S., 2011, p.67)

5. User's Involvement

(Iftikhar, S., Khan, A., Bokhari, R., and Abbaset , M.,2011, p.294), (Gorla, N., and Lin, S.C.,2010, p.1410).

6. Employee's Attitude and Project Team

(Ibrahim M., Sharp M. and Syntetos A. ,2008, p.4), (Finney, Sherry, Corbett, and Martin, 2007, p.129), (Ganesh, Mehta and Arpita, 2010, p.70).

7. Communication Plan.

(Esteves J, and Pastor J, 2000, p.3), (Rabaa'I, A.,2009 p.19), (Ganesh, Mehta and Arpita, 2010, p.66).

C. Technological critical success Factors

1. Organization Fit with ERP Package

(Moller, C., and Chaudhry S., 2012, pp.48)

2. ERP System Configuration
(Leyh C., 2014, p.1186, Shatat, A., 2015)

3. IT Infrastructure

(Abdelghaffar, H., 2012), (Nour, M.A. and Mouakket, S., 2011, p.371)

4. Compatibility

(El meziane, K., Chuanmin, S., and El meziane, M., 2011, p.6).

5. Legacy Systems

Holland C.P. and Light B., 1999, Nah, F.F-H., Lau, J.L-S. and Kuang, J., 2001, p.137), (Reimers, K., 2002), (Al-Mashari, Majed., Al-Mudimigh, Abdullah, Zairi, and Mohamed, 2003), (Ferrario, L. and Montagna, J.M.,2004, p.3).

6. Data Accuracy (Ngai, E.W.T., Law C.C.H., Wat F.K.T. 2008), (Wu, J., 2007, p.743)

7. IT maturity and Computer culture.

(Supramaniam, M. and Kuppusamy, M., 2011, p.371)

8. ERP Complexity (Frimpon, M., 2012, p.233)

9. The Selection of the Appropriate ERP Package

(ALdayel, A., Aldayel, M., and Al Mudimigh A., 2011, p.8)

Service Quality
Service Quality Models

There are many models that exist in literature to measure the quality of service. Generally, some of these models work as a commencement for other models. There are many factors that influence the selection of the appropriate model to measure the service quality such as the cost of implementation. The following are an examples of service quality models: SERVQUAL Model, The Gaps Model of Service Quality, SERVBERF Model, Swan and Combs (1976) Model, Lehitnen & Lehitnen 1982 Model, Grönroos (1984) Model and Multilevel Model

SERVQUAL Model

SERVQUAL model has been developed by A. Parasuraman, Valarie Zeithaml & Leonard Berry in 1985 (Parasuraman, Zeithaml, and Berry, 1988) when they have performed an extensive qualitative study along with the handful work of some researchers such as (Sasser, Olsen, Wyckoff 1978; Gronroos 1982; Lehtinen and Lehtinen 1982) and concluded ten dimensions (tangibles, reliability, responsiveness, communication, credibility, security, competence, courtesy, understanding/knowing the customer, and access) that are used by the customers in order to evaluate the service quality, those ten items were revised into specific five dimensions as follows :

- Tangibles: the physical elements of the service such as the uniform of personnel, instruments and physical facilities.
- Reliability: the ability to perform the committed service dependably and accurately.
- Responsiveness: providing instant service and the willingness to assist customers.

• Assurance: the ability to inspire confidence, awareness, understanding and friendliness of employees.

• Empathy: the firm provides concern and personal attentiveness to its customers.

Hypotheses Testing

In order to test the research hypothesis, a group of sub-hypotheses are emerged from the main hypothesis will be tested as follows:

H1.1: There is a significant impact of ERP system critical success factors on tangible aspects of the service quality in the Egyptian telecommunications organizations.

In order to test the previous hypothesis, the multiple regression analysis is used as shown in the following table:

Independent Variables	Unstandardized Coefficient B	Standardized Coefficients Beta	T- Test	
			t	Sig
Technological Factors	0.720	0.706	19.866	0.000
Organizational Factors	0.149	0.133	2.947	0.003
Human Factors	0.092	0.080	2.234	0.026
F	905.994			
Sig	0.000			
R^2	0.795			
R	0.891			

Table (5): regression weights for H1.1

From the previous table, it is concluded that:

The explanatory power of the model

The value of coefficient of determination (R^2) is 0.795, indicating that the independent variable ERP critical success factors (human, organizational and technological) is explaining 79% of the variance in the dependent variable (tangible aspects of the service quality) in the studied companies.

Significance of regression model

The value of correlation coefficient (R) is (0.89),1indicating a strong correlation between combined independent variables and the dependent variable in the companies' understudy.

The result of the F-test refers to the significance of the multiple regression model as the level of significance is below (0.05), accordingly, at least one of the independent variables has a significant impact on the dependent variable.

Significance of independent variables

The unstandardized coefficients B values of independent variables clarify that:

- The B value of the independent variable (technological factors) is (0.720) indicating a positive relationship between this variable and the dependent variable (tangible aspects). The result of the T- test indicates a significant relationship and a significant impact of the independent variable, as the significance level is below (0.05), accordingly, the alternative hypothesis is accepted which provides

that: "There is a significant impact of the ERP critical success factors on tangible aspects of the service quality".

- The B value of the independent variable (organizational factors) is (0.149), indicating a positive relationship exists between this variable and the dependent variable (tangible aspects). The result of the T- test indicates a significant relationship and a significant impact of the independent variable as the level of significance is below (0.05), <u>consequently, the alternative hypothesis is accepted which claims that: "There is a significant impact of ERP critical success factors on tangible aspects of the service quality"</u>.

- The B value of the independent variable (human factors) is 0.092 indicating a positive relationship exists between this variable and the dependent variable (tangible aspects). The result of the T- test indicates a significant relationship and a significant impact of independent variable at significance level below (0.05), and <u>accordingly, the alternative hypothesis is accepted which provides: "There is a significant impact of ERP critical success factors on tangible aspects of the service quality"</u>.

- According to the values of Beta Coefficients, the independent variables can be sorted based on the relative importance as follows:

  - Technological Factors (B=0.706)
  - Organizational Factor(B=0.133)
  - Human Factors (B=0.080)

H1.2 There is a significant impact of ERP system critical success factors on reliability of service quality in the Egyptian telecommunications organizations.

In order to test the previous hypothesis, the multiple regression analysis is used as shown in the following table:

Independent Variables	Unstandardized Coefficients B	Standardized Coefficients Beta	T- Test	
			t	Sig
Technological Factors	0.592	0.594	15.256	0.000
Human Factors	0.206	0.182	4.659	0.000
Organizational Factors	0.144	0.131	2.650	0.008
F				714.917
Sig				0.000
R^2				0.753
R				0.868

Table (6): regression weights for H1.2

From the previous table, it is concluded that:

The explanatory power of the model

The value of coefficient of determination (R^2) is (0.753), clarifying that the independent variable ERP critical success factors (human, organizational & technological factors) are explaining 75% of the variance in the dependent variable (reliability of the service quality).

Significance of regression model

The value of correlation coefficient (R) is (0.868), indicating a strong correlation exists between combined independent variables and the dependent variable.

The result of the F-test refers to the significance of the Multiple Regression Model as the significance level is below (0.05) and accordingly, at least one of the independent variables has a significant impact on the dependent variable.

Significance of independent variables

The unstandardized coefficients B values of independent variables clarify that:

• The B value of the independent variable (technological factors) is (0.592), indicating a positive relationship between this variable and the dependent variable (reliability of service quality). The result of the T- test indicates a significant relationship and a significant impact of the independent variable, as the level of significance is below (0.05), Accordingly, the alternative hypothesis is accepted which provides: "There is a significant impact of ERP critical success factors on reliability of service quality"

• The B value of the independent variable (human factors) is (0.206), indicating a positive relationship exists between this variable and the dependent variable (reliability of service quality). The result of the T-test indicates a significant relationship and a significant impact of the independent variable as the level of significance is below (0.05), and consequently, the alternative hypothesis is accepted which provides that: "There is a significant impact of ERP critical success factors on reliability of service quality"

• The B value of the independent variable (organizational factors) is (0.144), indicating a positive relationship exists between this variable & the dependent variable (reliability of service quality). The result of the T- test indicates a significant relationship and a

significant impact of the independent variable, with a significance level below (0.05), <u>consequently, the alternative hypothesis is accepted which provides: "There is a significant impact of ERP critical success factors on reliability of service quality"</u>

• According to the values of Beta Coefficients, the independent variables can be sorted based on the relative importance as follows:

- Technological Factors (B= 0.594)
- Human Factors (B=0.182)
- Organizational Factors (B=0.131)

H1.3 There is a significant impact of ERP system critical success factors on assurance of service quality in the Egyptian telecommunications organizations.

In order to test the previous hypothesis, the multiple regression analysis is used as shown in the following table:

Independent Variables	Unstandardized Coefficients B	Standardized Coefficients Beta	T- Test	
			t	Sig
Technological Factors	0.563	0.562	12.400	0.000
Human Factors	0.220	0.194	4.262	0.000
Organizational Factors	0.108	0.099	1.709	0.088
F	466.810			
Sig	0.000			
R^2	0.666			
R	0.816			

Table (7): regression weights for H1.3

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From the previous table, it is concluded that:

The explanatory power of the model

The value of coefficient of determination (R^2) is (0.666), clarifying that the independent variable ERP critical success factor (human, organizational & technological factors) are explaining 66% of the variance in the dependent variable (the assurance of service quality).

Significance of the regression model

The value of correlation coefficient (R) is (0.816), indicating a strong correlation between the combined independent variables & the dependent variable.

The result of the F-Test refers to the significance of the multiple regression model as the significance level is below (0.05), accordingly, at least one of the independent variables has a significant impact on the dependent variable.

The Significance of the Independent Variables

The Unstandardized Coefficients B values of the independent variables indicating that:

•   The B value of the independent variable (technological Factors) is (0.563), indicating a positive relationship exists between this variable & the dependent variable (assurance of service quality). The result of the T- Test indicates a significant relationship and a

significant impact of the independent variable, as the significance level is below (0.05), Accordingly, the alternative hypothesis is accepted providing that: "There is a significant impact of ERP critical success factors on assurance of service quality"

• The B value of the independent variable (organizational factors) is (0.108), indicating a positive relationship exists between this variable and the dependent variable (assurance of service quality). The result of the T- Test indicates a significant relationship & a significant impact of the independent variable as the level of significance is below (0.05), accordingly, the alternative hypothesis is accepted provide that: "There is a significant impact of ERP critical success factors on assurance of service quality".

• The B value of the independent variable ERP critical success factor (Human Factors) is (0.092) indicating a positive relationship exists between this variable and the dependent variable (assurance of service quality). The result of the T- Test indicates a significant relationship and a significant impact of the independent variable as the level of significance is below (0.05), accordingly, the alternative hypothesis is accepted which provides: "There is a significant impact of ERP critical success factors on assurance of service quality".

• According to the values of Beta Coefficients, the independent variables can be sorted due to their relative importance as follows:

  • Technological Factors (B= 0.562)

  • Human Factors (B=0.149)

  • Organizational Factors (B=0.099)

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Recommended Future Researches

- Other studies can address other critical success factors listed in the ERP literature such as stakeholders' management.
- The implementation of ERP system in other less developed countries.
- The impact of the next generations of the Enterprise Resources Planning to include ERPII and ERP III on service quality.

References

Abdelghaffar, H., (2012), "Success Factors for ERP implementation in large organizations: The Case of Egypt ", **The Electronic Journal of Information System in Developing Countries**, Vol.52, No.4, pp.1-13, Egypt.

Al-Mashari, Majed., Al-Mudimigh, Abdullah, and Zairi, Mohamed (2003), "Enterprise Resource Planning: A Taxonomy of Critical Factors", **European journal of operational research,** Vol.146, No. 2, pp. 352-364.

Al Qashami, A., and Mohammad H., (2015), "Critical Success Factors (CSF) of Enterprise Resource Planning (ERP) System Implementation in Higher Education Institutions (HEIs): Concepts and Literature Review", **Computer Science and Information Technology**, pp.81-98

AL Sayed, G. M., and Mostafa G. M., (2003), **Statistical Sampling**, Ain shams Library, Cairo.

Althonayan, M., (2013), "Evaluating Stakeholders Performance of ERP Systems in Saudi Arabia Higher Education", **A PhD. Thesis**, Brunel University.

Arabi, M, Saman, M., Wong, K., Beheshti H. M., and Za-kuan, N (2011), "Critical Success Factors of Enterprise Resource Planning Implementation in Small and Medium Enterprises in Developing Countries: A Review and Research Direction", **Industrial Engineering and Service Science, IESS,** pp.153-158

Belkhamza Z., and Wafaa S., (2012), "Measuring Organizational Information Systems Success: New Technologies and Practices", **Business Science, IGI Global**.

Brehm, L., Heinzl, A. and Markus, M. L. (2001), "Tailoring ERP systems: A spectrum of choices and their implications, in R. Sprague (ed.)", Proceedings of the 34th Annual Hawaii International Conference on Information Systems, Maui, HI**., IEEE, Computer Society**, Vol. 9

The Effect of ERP System Implementation on Aspects of Service Quality: An empirical study on the Egyptian Telecommunications Sector

Cotteleer, M. J. (2001) "Operational performances following ERP implementation", Graduate School of Business Administration, Harvard University, USA, **Ph.D. Thesis**

Cronin, J. and Taylor, S., (1992), "Measuring service quality: re-examination and extension", **Journal of Marketing**, Vol.56, No.3, pp.55–68.

Curko K., Stepanic D., and Varga, M. (2012), "Strategic success factors in ERP system implementation", Recent Researches in Business & Economics, The 4th WSEAS World Multiconference, **An Applied Economics, Business & Development(AEBD'12)**, Portugal, p.25.

Davenport, T. (1998), "Putting the enterprise into the enterprise system", **Harvard Business Review**, Vol.76, No4, pp.121-131.

Dixit, A.Kr. and Prakash O., (2011), "A Study of the Issues Affecting ERP Implementation in SMEs", -**Journal of Arts, Science & Commerce**, Vol.– II, Issue –2, pp.77-85.

El-garaihy, W., (2013), "Developing and Validating a Hospitality Service Quality Scalein Saudi Arabia (HOSP-SQ) A Structural Equation Model", **International Journal of Business and Social Science**, KSA, Vol. 4 No. 14, p.225.

Elnaghi, Al Shawi, and Seitanidi, (2008), "Towards Designing A sustainable IS Enabled Service Delivery System", **European and Mediterranean Conference on Information Systems**, pp.1-16.

EL-refae B., (2012), "The Relationships between Service Quality, Satisfaction, and Behavioral Intentions of Malaysian Spa Center", **International Journal of Business and Social Science,** Vol. 3 No. 1, pp.198-205

El Sawah, S., Tharwat A., and Rasmy, M., (2008), "A quantitative model to predict the Egyptian ERP implementation success index", **Business Process Management Journal**, Vol. 14 Iss: 3, pp.288 – 306.

Elsayed, A., (2016), "The role of manufacturing strategy in achieving the corporate social responsibility", **Journal of Business Studies**, Helwan University, Cairo, Egypt

Esteves J, Pastor J, (2000), "Towards the unification of critical success factors for ERP Implementations", **10th Annual BIT conference**, Manchester, UK.

Gronroos, C., (1982), "Strategic Management and Marketing in Service Sector", **Swedish School of Economics and Business Administration**, Helesingfors.

Holland C. P. & Light B. (1999), "A critical Success Factors Model for ERP Implementation", **IEEE software**, Vol.16, pp.30-36

Homewood, Ill., Irwin D.J. Globerson, S. (1985) "Issues in developing a performance criteria system for an organization", **International Journal of Production Research**, Vol.23, No.4, pp.639-646.

Ifinedo, P., (2001), "ERP System Success Assessment, an Integrative Framework**", Dissertation,** University of Jyvaskyla ,2006.

Information Resources Management Association, (2013), **Enterprise Resource Planning: Concepts, Methodologies, Tools, and Applications**, IGI Global, p.769.

lsabaawi M., Y. (2015),"Critical Success Factors for Enterprise Resource Planning Implementation Success", **International Journal of Advances in Engineering & Technology**, Vol. 8, Iss. 4, pp. 496-506.

Jafari, Osman, Yusuff and Tang, (2006), "ERP systems implementation in Malaysia: the importance of critical success factors", **International Journal of Engineering and Technology**, Vol. 3, No.1, pp. 125-131.

Kushwah, S., and Bhargav, A., (2014), "Service Quality Expectations and Perceptions of the Telecom Sector in India", **International Journal of Advancements in Technology**, Vol. 5 No.1, pp.1-10.

Lau, P.M., (2005), "Service quality: a study of the luxury hotels in Malaysia", **Journal of American Academy of Business**, Vol.7, No. 2, pp.46–55, Cambridge.

Lehtinen, Uolevi and Jarmo R. L., (1982), "Service Quality: A study of Quality Dimensions", unpublished working paper, **Service Management Institute**, Helsinki, Finland, OY.

Leisen B., and Vance C., (2001) "Cross-national Assessment of Service Quality in Telecommunication". **Journal of Marketing**. Vol.11, No.5, pp.307-317.

Leyh, C., (2014), "Critical Success Factors for ERP Projects in Small and Medium-sized Enterprises – The Perspective of Selected German SMEs", **The Federated Conference on Computer Science and Information Systems**, Vol. 2, pp. 1181–1190.

Loh., T.C. & Koh, (2004), "Critical elements for a successful enterprise resource planning implementation in small & medium sized enterprises", **International Journal of Production & Research**, Vol.42, No.17, pp.3433-3455.

Loke S., Taiwo, A., Salim, H., and Downe, A., (2011), "Service Quality and Customer Satisfaction in a Telecommunication Service Provider", **International Conference on Financial Management and Economics**, Singapore.

Lorraine J. Staehr, (2007), "Achieving Business Benefits from a Global ERP Implementation", **IRMA International Conference,** pp.449-453.

Madu, C.N., (1998), **Introduction to Quality, Handbook of Total Quality Management**, Kluwer Publisher, Boston, MA.

Michael F. (2012), "A Re-structuring of The Enterprise Resources Planning Implementation Process", **International Journal of Business and Social Science**, Vol. 3 No. 1, pp.231-243.

Moohebat M. R., Asemi, A., and Jazi M. D., (2010), "A Comparative Study of Critical Success Factors (CSFs) in Implementation of ERP in Developed and Developing Countries", **International Journal of Advancements in Computing Technology**, Vol.2, pp.99-110.

National Telecom Regulatory Authority, (2015), "Comparison between the Mobile Companies: Vodafone -Orange – Etisalat)", **NTRA**, Vol.5, Cairo.

Ngai EWT, Law CCH, Wat FKT. (2008), "Examining the critical success factors in the adoption of enterprise resource planning". **Computers in Industry**, Vol. 59, pp. 548–564.

Nazemi E., Tarokh M. J., and G. Reza Djavanshir, (2012), "ERP: A literature survey, **International Journal of Advanced Manufacturing Technology**, London, pp. 999-1018

Oliver R. L. (1980), "A cognitive model of the antecedents and consequences of satisfaction decisions". **Journal of Marketing Research**. Vol.17, pp.460-469.

Parasurman, A., Zeithaml, V., and Berry L., (1988), "SERVQUAL: A Multiple-Item Scale for Measuring Customer Perceptions of Service Quality", **Journal of Retailing**, Cambridge, Vol.64, No.1. pp.12-40

Parasurman, A., Zeithaml, V., and Berry L., (1985), "A Conceptual Model of Service Quality and Its Implications for Future Research", **The Journal of Marketing**, Vol. 49, No.4, pp. 41-50.

Pour, K., and Mehdi, (2008), **Encyclopedia of Information Science and Technology**, , IGI Global, Second Edition

Ram, J., Corkindale D., and LuWu, M., (2013), "Implementation critical success factors (CSFs) for ERP: Do they contribute to implementation success and post-implementation performance?", **Int. J. Production Economics**, Vol.144, pp. 157–174.

The Effect of ERP System Implementation on Aspects of Service Quality: An empirical study on the Egyptian Telecommunications Sector

, M. Tharwat, A., Elsawah, S., (2005) "Enterprise Resource Planning Rasmy (ERP) Implementation in the Egyptian Organizational Context". Proceedings of the **EMCIS International Conference.**

Rouhani S. and Ravasan, A., (2013). "ERP success prediction: An artificial neural network approach", Sharif University of Technology, **Scientia Iranica**, p. 995

Salaheldin, S.I., (1998) "The implementation of material requirements planning (MRP) systems in Egyptian manufacturing companies: an empirical study", **PhD thesis**. University of Glasgow, UK.

Saravanan, R., (2014), "Critical Success Factors of ERP Implementations – An Analysis", **International Journal of Multidisciplinary Research in Social and Management Science**, Vol.2, Iss.2, pp.11-117.

Sasser, W., Earl, Jr., Paul R. Olsen, and Daryl D. Wyckoff, (1978), **Management of Service Operations: Text and Cases**, Allyn & Bacon, Boston.

Seethamraju, R. and Seethamraju, J. (2008), "Adoption of ERPs in a Medium-sized Enterprise - A Case Study", **The 19th Australasian Conference on Information Systems**.

Slack, N., Johnes, A., and Johnston, R., (2010), **Operations Management**, Pearson Education Limited, p.409.

Smeds M., (2010), "Change management success factors in ERP implementation", **Master's Thesis**, Aalto University.

Swan, J. E. and Comb, L. J. (1976), "Product performance and consumer satisfaction: A new concept". **Journal of marketing**, April, pp.22-27.

Tavana and Madjid, (2012), "**Enterprise Information Systems and Advancing Business Solutions: Emerging Models**", IGI Global.

, W.H., Tsaur, T.S., and Chou, Y.W. (2009), "Evaluating the Information Tsai Systems Success of ERP Implementation in Taiwan's Industries", **IEEE, International Conference on Industrial Engineering and Engineering Management**, Hong Kong.

Wu,J. (2007), "Critical Success Factors for ERP System Implementation", International Federation for Information Processing, Volume 254, **Research and Practical Issues of Enterprise Information Systems II** Volume I, pp. 739-745.

Yaghubi, S., Modiri N., and Rafighi, M., (2014), "Model performance indicators ERP systems", **International Journal of Computer Science and Information Security**, Vol. 12, No.1, p.2.

Yeh T., Yang, C., Lin, W., (2007), "Service Quality & ERP implementation: A conceptual and empirical study of semiconductor-related industries in Taiwan, ScienceDirect – **Computer in Industry**, Taiwan, Vol. 58, pp.844-854.

Zeithaml,V.A., and M.J. Bitner, (2003), **Service Marketing: Integrating Customer Focus across the Firm**, McGrawHill, NY.

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The study questionnaire

Company Name:

Kindly place a checkmark in front of the sentence that expresses your point of view with respect to the following terms:

First: Enterprise Resources Planning

The followings are the success factors of ERP implementation. To what extent these factors are important for such an implementation in the company to which you are belonging:

The success factors of ERP implementation	Very Important	Important	Neutral	Not Important	Not Important at all
A-The Human Factors					
1- User's knowledge and familiarity of the ERP system					
2- User's training & Education & Job redesign					
3- User's participation in ERP application					
4- User's attitude towards ERP					

5- User's Commitments to business Ethics					
6- Top management Support to the ERP					
7- Effective Project Management & teamworking					
B -Organizational Factors					
8- Improving work efficiency					
9- The Implementation Strategy & time frame					
10- Organization's Business Process reengineering					
11- Change Management					
12- Coordination & Cooperation between Cross functional teams					
13- Cost of ERP implementation					
14- Stakeholders management & communication					
15- Culture Change & user's empowerment					

16- Organization's vision & objectives					
C- Technological Factors					
17- The selection of the appropriate ERP software package					
18- The system modification during implementation					
19- The selection of the appropriate ERP consultants					
20- The system integration with other systems in the organization					
21- Organization fit to the ERP package					
22- The IT infrastructure in the organization					
23- The Organization's Culture that supports Technology					
24- ERP complexity					
25-The Legacy System					
26- The Accuracy of used data					

Second: Service Quality

The Following are some of the important dimensions of service quality evaluation. To what extent these dimensions are applied in the company to which you are belonging to:

Service Quality Dimensions	Totally Agree	Agree	Neutral	Disagree	Totally Disagree
A- The Tangible Aspects of the Service					
1- The customer service centers use modern looking equipment					
2- The physical facilities at customer service center are visually appealing					
3- Employees at customer service centers are neat appealing					
4- The customer service facilities support the delivered services					
B- Reliability					
5- When the company promises to do something by a certain time, it fulfills it					

6- Customer's problems are solved sympathetically and logically					
7- The company provides its service at the time it promises to do so					
8- The company keeps accurate service records					
D- Assurance					
13- Customer's confidence increases in customer service agent					
14- Customers feel safe when dealing with customer service agent					
15- Customer Service Agents are consistently courteous with customers					
16- The customer service agent receives appropriate support to perform competent service					