

EMPIRICAL STUDY OF THE ACCEPTANCE OF ERP SYSTEM IN PUBLIC SECTOR SERVICE-BASED ORGANIZATIONS OF PAKISTAN

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ABSTRACT

Investment on Enterprise Resource Planning (ERP) systems has increasing trend in Pakistani organizations. Acceptance of entirely new technological system such as an ERP seems very critical in these organizations. In this study, the acceptance of ERP system was examined with Technology Acceptance Model (TAM) after the addition of user satisfaction dimension. Data was collected through field survey from 211 ERP end users from the public sector service organizations of Pakistan. For testing measurement and path models, partial least squares structural equation modelling (PLS – SEM) technique was applied. Findings indicate the positive and significant impact of user satisfaction on perceived usefulness (PU) and perceived ease of use (PEOU). In the same lines, PU and PEOU has positive influence on intention to use and finally intention to use positively increases the usage of ERP system in these organizations. Based on the findings, some practical implications were also discussed.

Keywords: ERP System, Technology Acceptance Model, User satisfaction

1) ACCEPTANCE OF ERP SYSTEM: THEORETICAL PERCEPTIVE

Information Technology has made the world a global village. Based on the information technology, Enterprise resource planning (ERP) systems has changed whole environment and business world culture. Due to its numerous benefits, ERP systems have gained massive acceptance. As explained by (Adam & Sammon, 2004) an ERP system is a multipart and complex system which is interactive and integrated with different data packages to upkeep all key organizational departments. ERP systems

generate important data and reports by assimilating and then integrating the raw information from external and internal collaborators (Motiwalla & Thompson, 2009). ERP systems are effective up to such extent that these systems can control supply chain activities by linking front office modules with back office modules (Yang & Su, 2009). These systems use a single data base with common application and same interface for all users across the organization. ERP systems address business uncertainties proactively, in such a fashion that it diminishes threats, take full advantage of opportunities, and achieve objectives optimally. It is a challenging job to implement an ERP system, which requires intensive planning and consultation. For many bigger organizations implementation can be an extremely complex task. It eventually requires some significant changes in employees and related work practices (Gupta & Kumar, 2011).

Businesses gain competitive advantage by condensing the time to complete a business process, with the use of ERP systems (Olhager & Selldin, 2003). In addition, the organizational performance can be enhanced by using the ERP systems effectively because it can reduce the costs through improved financial management and decrease the response time to the customers (Calisir & Calisir, 2004). Keeping in view the benefits provided by ERP systems, these are considered to be the most accepted business software (Muscatello & Chen, 2008). In spite of a considerable and acknowledging acceptance of ERP systems as a vital tool to get competitive advantage, many organizations fail to implement the ERP systems successfully and face severe financial losses (Koch, 2004a; Koch, 2004b). In many organizations end users do not accept and use ERP systems, even after successful implementation which also leads to System failure.

A great piece of work I executed and carried out for the investigation of ERP acceptance by using different models i.e. (TPB) Theory of planned behavior (Ajzen, 1991), (TRA) theory of reasoned action (Fishbein & Ajzen, 1975) and (TAM) technology acceptance model (Davis, 1989). The relationship/ effect of perception of the end user on the actual usage is missing link in literature (Ifinedo, 2007; Amoako-Gyampah, 2004). The central objective of the study is:

“To find the influence of user satisfaction on usage of ERP systems, in context of Service sector of Pakistan”

The acceptance of the end user while implementing a new technology, is the vital pillar of its success. A very successfully implemented ERP system can be failed dramatically, if not accepted by the users. The deficiency of user acceptance has long been the major research issue. Most of the information systems in organizations have aim and goal to improve the efficiency, effectiveness and performance at job. But if this system is rejected by the users, the information system fails to achieve that goal.

In the beginning, the acceptance and usage of information technology has been explained by two major theories. First is (TRA) established by Fishbein & Ajzen (1975). Similarly, (TPB) presented by (Ajzen, 1991). To achieve the purpose of introducing and promoting new technologies, Davis (1989) established a new model which is the derivation of (TRA) (Fishbein & Ajzen, 1975). This model measures the effect of system related external factors on perception related internal beliefs and user intentions that consequently affecting the acceptance. TAM is the predictor of user's acceptance or rejection after introducing a new technology (Hong et al., 2011). In comparison with remaining theories only TAM is proved to be more meaningful, predicative, and vigorous with high degree of applicability (Amoako-Gyampah & Salam, 2004; Venkatesh & Davis, 2000; Lee et al., 2010).

TAM established that (PU) is one important belief while (PEOU) is second vital belief of the end user and both beliefs have relation with actual acceptance behaviour of the end user (Davis et al., 1989). PU is the perception of an end user about the fact that using ERP or a new technology will augment his performance at job. PEOU is the perceived opinion of end user about the easiness of the system or technology and the perception that its usage is effortless (Davis, 1989, p. 320). Both (PU) and (PEOU) are motivational factors, which provoke any positive or negative "attitude". This attitude consequently aggravates the "intention to use or accept" technology which leads repeated usage (Davis, 1989).

TAM was again reviewed by Davis (1993) to find the fact that how system characteristics impact the user acceptance. This modified TAM suggested a model to improve the user acceptance by increasing the system features, interface and quality. According to Davis (1993) system design is an external stimulus for an information system user. *PU and PEOU* are the cognitive responses instigated by system design features (an external stimuli). This cognitive response initiates an effective response in the shape

of “attitude towards using the system” and effective response further originates the “actual usage of the system” as behavioural response.

Venkatesh & Bala (2008) introduced a newer description of TAM as (TAM-3). This model further elaborated the important aspects that impact the (PEOU) and (PU) in a broader way by introducing “*System Characteristics*”, “*Individual Differences*”, “*Facilitating conditions*” and “*Social Influence*” provided to end users. This research will focus on the simple TAM by introducing the role of user satisfaction in usage of ERP system.

In a specific and given scenario/situation, user satisfaction is attitudes and feelings of someone about different factors which can effect that scenario/situation (Wixom & Todd, 2005). In literature, satisfaction of end user and user acceptance regarding new technology are two different and important research streams that have developed in parallel with each other. The role of user satisfaction while accepting a system has been viewed differently by different researchers. User satisfaction is a weak forecaster of usage because it is normally based on information and design attributes (Davis et al. 1989, Melone 1990).

According to (Hartwick & Barki 1994, Goodhue 1988 & Melone 1990) these two approaches should be combined and integrated. Wixom & Todd (2005) conducted a research to combine both research streams and concluded that user satisfaction has a good impact on Perceived Usefulness and PEOU.

2) RESEARCH MODEL AND HYPOTHESES

After extensive literature review, this study suggests a research model which has been shown in **Figure-1**. In this proposed model user satisfaction is the predictor of PU and PEOU, whereas PEOU has also direct impact on PU. Furthermore, PEOU and PU both leads to intentions to use the system which triggers to system usage.

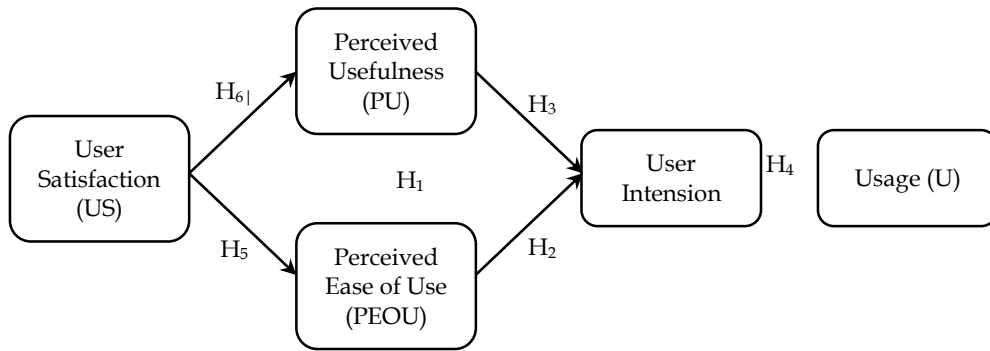


Figure 1: Research Model

TAM has been tested by many researchers in the context of ERP systems. Results established by all these researchers show that a positive relationship of PU and PEOU. Furthermore, PU and PEOU directly affect the intention to use the system. Consequently, Intention to use directly affects the actual usage of the system (Davis, 1989; Amoako-Gyampah & Salam, 2004; Zhang et al, 2013, Venkatesh & Bala, 2008 and Lee et al, 2010). Above literature helped to develop following hypothesis

- H1:** PEOU has a significant and positive relationship with PU.
- H2:** PEOU has a significant and positive relationship with Intention to use.
- H3:** PU has a significant and positive relationship with Intention to use.
- H4:** Intention to use has a significant and positive relationship with Usage of the system.

Wixom & Todd (2005) divided user satisfaction into two categories i.e. System Satisfaction, Information Satisfaction and concluded in their research that system satisfaction has positive relationship with (PEOU). Furthermore, in another study (Calisir & Calisir, 2004) found an indirect and insignificant relationship of PEOU with user satisfaction. While establishing the influence of user satisfaction on performance of the user and system usage (Hou, 2012) also found that User Satisfaction has positive relation between PEOU and PU. Doll & Torkzadeh (1988) presented another model and established the same results. On the basis of above literature this study established following hypothesis:

- H5:** User Satisfaction has positive relationship with PEOU.
- H6:** User Satisfaction has positive relationship with system Usage.

3) RESEARCH DESIGN

Positivistic paradigm was followed by using quantitative techniques (survey method) to find ERP acceptance and to find the impact of end user satisfaction on ERP acceptance. Data was collected from target population through well-structured questionnaires. The questionnaire covered 02 sections. First section covered the demographic information while next part covered different variable related questions to test the hypotheses. Second part measured responses on five point Likert scale i.e., “Strongly disagree”, “Disagree”, “Neutral”, “Agree”, “Strongly Agree”.

3.1) Data Collection and Sampling

All Public sector service providing organizations of Pakistan are the target population of the current study. This study focused mainly on four major public sector service organizations who have successfully implemented ERP systems. Due to time and geographical constraints, data was collected only from Lahore region of the targeted organizations.

A convenience sampling technique was implemented in current study as the size of the target population is unknown (Farokhi & Mehmoudi, 2012). 300 questionnaires were distributed in targeted organizations while 251 were returned back. Thus, the response rate of the study was 83%. During scrutiny, 40 questionnaires were found incomplete and subsequently they were excluded. Therefore, only 211 questionnaires were used for the further analysis.

3.2) Measurement of Variables and Instrument Design

The instrument of survey will be used in this study to achieve the objectives and to measure user acceptance. A self-administered questionnaire will be used to collect the quantitative data. The first section consists of the respondent’s demographic information of the respondents like their gender, age, experience, cadre (Officer or Subordinate). In the second section, questions of the dimensions of (TAM) are asked. (PU) and (PEOU) are measured with four items each respectively, that were also validated and used by (Davis, 1989; Amoako-Gyampah & Salam, 2004; Zhang et al, 2013). Intention to use and actual Useage are measured by three and three items respectively (Venkatesh & Bala, 2008). User Satisfaction has been operationalized in four constructs that are content, accuracy, format and

timeliness. Content will be measured by for items. While accuracy, format and timeliness with two items each respectively (Doll & Torkzede, 1988; Hou, 2012). Table one shows the complete list of all items that has been used in the study.

3.3) Data Analysis

SPSS 16 was utilized for the purpose of demographic data analysis. Various results of the demographic analysis have been shown in **Table-2**. To test the proposed hypotheses, Partial Least square method has been used in this study. Venkatesh & Bala (2008) also used PLS method to test the Technology acceptance Model (TAM). Structure equation modelling (SME) technique has been adopted because PLS-SME technique is very useful when multivariate effect and relationship of several variables have to be tested with a dependent variable. The data has been analysed, using SmartPLS 3.0 software as suggested by (Ringle et al., 2005). In SmartPLS Cronbach's alpha, significance level of path coefficients and loading values have been found using bootstrapping (500 resampling) method.

4) FINDINGS OF THE STUDY

After analysis of the collected data, 75 out of 211 respondents (35%) were found to have relevant ERP experience of 1-4 years. This group has the highest percentage of responses, among all age groups. Lowest percentage of responses were recorded from the group of having experience of more than 11 years. Data showed that Subordinate cadre was more involved in providing responses as compared to Executive cadre as 117 responses out of 211 (55%) were subordinates. Further results showed that 74 % of the respondents were males which shows that there are less female staff working in Public sector service providing organizations of Pakistan. All above results have been shown in Table 1.

Table 1: Demographic Profile of Respondents

Variable	Category	Frequency (f)	Percentage (%)
Experience	• 1-4 years	75	35
	• 5-10 years	69	33
	• 11-15 years	33	16
	• More than 15 years	33	16
Cadre	• Middle Level	117	56
	• Executives	93	44
Gender	• Males	161	76
	• Females	50	24

4.1) Reliability and Validity Analysis

In this research two reliability measures have been examined and analysed. One is Cronbach’s α and other is composite reliability. As per PLS-SME protocol the values of Cronbach’s α must be greater than 0.70. **Table-2** shows that all constructs have Cronbach’s α values, greater than 0.70 which shows good reliable of the constructs. Composite reliability (CR) should be greater than 0.07. CR value of all constructs is also more than its required limit and is exceeding from 0.80 as shown in **Table-2**. The degree of convergent validity is represented by the value of Average variance extracted (AVE). The value of AVE must $> OR = 0.5$ (Bagozzi et al. 1991). In this study AVE values of all constructs are greater than 0.5. These results show in following **Table 3** indicated that the collected data is reliable and valid in every context.

Table 2: Reliability and Validity Analysis

Model construct	Measurement Item	Loading Value	Cronbach’s Alpha	Composite Reliability (CR*)	Average Variance Extracted (AVE**)
Perceived Usefulness (PU)	PU1	0.842	0.866	0.909	0.715
	PU2	0.923			
	PU3	0.815			
	PU4	0.796			
Perceived Ease Of Use (PEOU)	PEOU1	0.833	0.863	0.907	0.709
	PEOU2	0.866			
	PEOU3	0.800			
	PEOU4	0.868			

Model construct	Measurement Item	Loading Value	Cronbach's Alpha	Composite Reliability (CR*)	Average Variance Extracted (AVE**)
Intention to Use (IU)	IU1	0.941	0.726	0.872	0.774
	IU2	0.814			
User Satisfaction (US)	US1	0.768	0.792	0.852	0.61
	US2	0.571			
	US3	0.722			
	US4	0.670			
	US5	0.794			
	US6	0.665			
Usage (U)	U1	0.846	0.863	0.907	0.708
	U2	0.840			
	U3	0.803			
	U4	0.877			
<p>-*CR is used to determine the reliability of the data. -**AVE is used to determine convergent validity.</p> <p><i>Note:- Loading values of different constructs of User satisfaction were <0.5. These constructs i.e. US3=0.432, US4=0.257, US5=0.445, US6=0.441 were deleted.</i></p>					

4.2) PLS-SEM Path Analysis

PLS-SME path analysis describes the effect of change in one variable on the other variable. The results of PLS-SME path analysis have been shown in **Figure-2**. Results of path analysis in this study show that 1 unit increase in (PEOU) will increase (PU) by 0.627 with a p-value < 0.05 (see **Table-3**). Similarly with one unit increase in Perceived Usefulness (PU), the user's intentions to use the ERP systems, will increase by 0.389 with p-value <0.05. Furthermore, with 1 unit increase in PEOU will increase user's intentions to use ERP by 0.345 with p-value < 0.05. Similarly, 1 unit increase in user satisfaction will enhance the perceived usefulness by 0.280 units. A strong relationship is found between user satisfaction and PEOU as results shows that with 1 unit increase in user satisfaction will increase PEOU by 0.596 units with p-value <0.05 (see **Table-3**). Furthermore, intentions of the user to use the system, positively affect the actual system usage. Results shows that with one unit increase in Intentions to use the system will increase 0.666 units of actual usage with p-value <0.05. Another insignificant but positive relationship is found between user satisfaction and system usage. Results of this relationship shows that with one unit change in user satisfaction will increase 0.144 units of system usage. **Figure-3** shows the values of path coefficients.

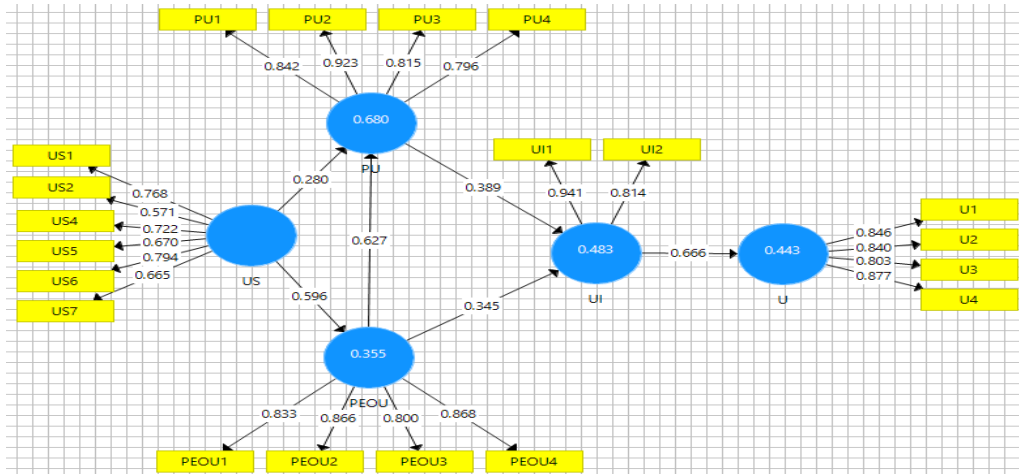


Figure 2: PLS Path Analysis

To support the results of PLS-SME path analysis Significance level, t-values and path coefficients have been shown in **Table-3**.

Table 3: Testing Hypotheses

Relationships	Sample Mean (M)	Path Coefficients (B)	T-Value	P-Value	VIF	Hypotheses
PEOU → PU (H1)	0.625	0.627	12.208	0.000*	1.550	Accepted
PEOU → Intentions to Use (H2)	0.350	0.345	4.434	0.000*	2.696	Accepted
PU → Intentions to Use (H3)	0.383	0.389	4.353	0.000*	2.696	Accepted
Intentions to Use → Usage (H4)	0.699	0.666	16.071	0.000*	1.000	Accepted
User Satisfaction → PEOU (H5)	0.602	0.596	12.721	0.000*	1.000	Accepted
User Satisfaction → PU(H6)	0.284	0.280	4.967	0.000*	1.550	Accepted

-* Significant positive relationship.

5) DISCUSSION AND CONCLUSION

The primary objective was to examine user acceptance in service providing public sector Pakistan. In addition to test the TAM, the effect of user’s satisfaction on ERP usage has also been tested. For this, data has been collected from 211 employees of Service providing service sector organizations of Pakistan. The proposed model has been tested using PLS-SEM. While analysing TAM, a strong relationship between PEOU and PU

has been found. This shows that in Pakistani setting, users believe that the easiness of system increases its perceived usefulness. This proves that PEOU leads to PU and PEOU also leads to Intentions to Use the system. During data analysis it was also found that PU also leads to intentions to use as there is a positive significant relationship between intentions to use and PU. These results are consistent with (Davis, 1989; Amoako-Gyampah & Salam, 2004; Lee et al, 2010 and Zang et al, 2013, Venkatesh & Bala, 2008). While analysing the relationship of user's satisfaction with PEOU, a strong positive relationship between the two variables has been found. Which shows that User's satisfaction is a good predictor of PEOU and PU. In this way it is suggests that more user satisfaction increases user acceptance of the ERP system in the context of Pakistan.

6) IMPLICATIONS OF THE STUDY

This study makes contribution for researchers as well as practitioners. For researchers, this study provides an integration of theoretical backgrounds and the findings in exploring the role of user satisfaction for the acceptance of a technological system such as an ERP. Similarly, the impact of Object Based beliefs (OBB) (PU, PEOU, user intention) on actual behaviour of the end users (usage of ERP system) is measured, which is a theoretical contribution particularly in the context of Pakistan. In the same lines, the study highlighted the influence of user satisfaction on technology acceptance using (TAM) which was empirically validated in this study.

This study provides many implications for the partitions. Firstly practitioners may change their direction on the other aspects to the satisfaction of the end users for the successful acceptance of ERP system from lower level to high level staff working on ERP system. The study provides in-depth knowledge of the relationship between user satisfaction and ERP acceptance.

The study also contributed that (PU) and (PEOU) increases the usage of ERP which ultimately indicates that organizations should give more attention to change the wrong belief of the end users about an ERP system (e.g., fear of technology and fear of losing powers) and they should impart the benefits and usefulness of ERP system in the minds of end users.

This study will be a benchmark for the industry to follow the argument which include empirical evidences and warrants in the context of Pakistani

service-based organizations where ERP system was successfully implemented. The argument of the present study is that user satisfaction is good predictor of (PU) and (PEOU). More satisfied end users of ERP system can easily understand and ERP system becomes more useful for them. Therefore, organizations should enhance employee satisfaction level to increase the acceptance of ERP system.

7) LIMITATIONS OF THE STUDY AND FUTURE DIRECTION

The present study has many limitations. The current study was conducted in service based-originations in Pakistan. Secondly, the study was based on quantitative research design i.e., survey research design with the small sample size. Thirdly, only user satisfaction was used as the determinant of ERP system acceptance.

Based on the abovementioned limitation, some suggestions for future researchers are appended below:

The future researchers should:

- 1) Replicate the same model in the context trading and manufacturing organizations to test the generalizability of the model presented by the presented study
- 2) Apply qualitative research design for the in-depth study to find out the factors influencing ERP system acceptance e.g., individual, technological or organizational factors.
- 3) Incorporate other determinants of acceptance of EPR system along with user satisfaction

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