

Evaluation of the Electronic Services System for Taibah University in Light of the Dimensions of Information Systems

Dr. Ahmed Abdelqader Abuseeni Dr. Husam Alfahl

Department of Management Information Systems, College of Business Administration, Taibah University

Abstract

The study aims to identify the strengths and weaknesses of the electronic services system at Taibah University by highlighting the achievements of aspects of the information systems from faculty members' perspectives. First, we defined the three dimensions of information systems using a descriptive approach; then, with the help of four experts, we designed a questionnaire and distributed it to 150 faculty members from different Taibah University departments. We applied statistical analyses, including exploratory factor analysis and frequency analysis, we also applied confirmatory factor analysis and structural equation modeling. The study concludes with a proposed scenario for improving the performance of the electronic services system at Taibah University.

Keywords: electronic services system (ES), information systems dimensions, confirmatory factor analysis (CFA).

1. Introduction

This research evaluates the information system aspects of the electronic services system (ES) at Taibah University through a user survey. Highlighting user difficulties is a step toward proposing appropriate solutions and developing a clear vision to circulate to emerging universities for consideration with regard to their electronic academic systems.

Information systems have three dimensions: organization, management, and technology (Laudon & Laudon, 2012). Organization includes employees, structure, business processes, politics, and culture. Management's role is to understand various situations faced by organizations and make decisions, as well as to formulate action plans to solve organizational problems. Information technology is a tool that managers use to cope with change (Laudon & Laudon, 2012).

2. Literature review

Although studies in this field of research are plentiful, valid and reliable measures for successful information systems have yet to be developed and should be continued in future research (Petter, DeLone, & McLean, 2008; Sedera & Gable, 2004).

Petter et al. (2008) reported a qualitative literature review of 180 papers published during the period 1992–2007. They used six dimensions to evaluate information systems (IS) success in their research model, and these dimensions are system quality, information quality, service quality, use, user satisfaction, and net benefits. The results showed that researchers tend to focus on single dimensions of IS success, and some of the dimensions may no longer be relevant (Petter et al., 2008). The article concludes with some recommendations for future research in the field.

According to Laudon and Laudon (2012), to understand information systems in business, we must understand organization, management, and information technology dimensions of systems as well as their effects in providing solutions to challenges and problems (see Figure 1). This research used the model produced by Laudon and Laudon (2012), which focused on the three dimensions of information systems mentioned earlier.



Figure 1. The three dimensions of information systems (Laudon & Laudon, 2012)

Al-Otaibi and Al-Zahrani (2003) studied and analyzed the practices and characteristics of a number of Saudi commercial websites, including marketing, human interaction, knowledge support, and electronic commerce (eCommerce). They concluded that that Saudi websites are not eCommerce-oriented and have very weak marketing facilities, human interaction methods, knowledge, and support tools. Although most of these sites had reasonable content, this content was not intended to serve diverse classes of visitors (Al-Otaibi & Al-Zahrani, 2003).

Al-Shaya and Oyaid (2015) studied the use of Google+ for educational purposes on 92 female students at Princess Nourah University. The study focused on identifying the advantages of using Google+ as well as the difficulties faced by the users, and to measure the degree of satisfaction toward such experience. They used personal interviews and distributed questionnaires to measure the degree of student satisfaction with Google+. The study's results showed the most important features of Google+ and the difficulties students faced while using it. In addition, the results showed that the students experienced a high level of satisfaction and that they would use Google+ again for the same purpose (Al-Shaya & Oyaid, 2015). They concluded by providing recommendations, including training faculty members in using Google+ effectively in their courses (AlShaya & Oyaid, 2015).

Liaw (2008) investigated learners' behavioral intentions and satisfaction as well as the effectiveness of the Blackboard electronic learning (e-learning) system to better understand the reasons why some learners are dissatisfied with their experience. The researcher surveyed 424 university students and found that perceived self-efficacy is an important factor in learners' satisfaction with Blackboard, finding that both perceived usefulness and perceived satisfaction contribute to learners' behavioral intentions in using Blackboard. Moreover, multimedia instruction, interactive learning activities, and e-learning system quality influenced eLearning effectiveness. The researcher concluded by proposing a conceptual model for understanding learners' satisfaction, behavioral intention, and effectiveness of using the eLearning system (Liaw, 2008).

3. Research Problem

We express our research problem through the following questions:

What is the extent of the support that ES at Taibah provides for faculty members to achieve the first information system dimension (organization)?

What is the extent of the support that the ES at Taibah provides for faculty members to achieve the second information system dimension (management)?

What is the extent of the support that the ES at Taibah provides for faculty to achieve the third information system dimension (technology)?

The answers to these questions highlight this research's importance in providing a theoretical framework based on the definitions of the three information system dimensions. The practical importance of these answers is that they confirm or deny, partially or completely, the feasibility of applying these dimensions to the ES of Taibah University.

Our research objectives are as follows:

- a. Determine the levels of respondents' answers regarding the extent of the support the ES provides at Taibah University for faculty to achieve the three information system dimensions.
- b. Disclose the nature of the most influencing dimension that applied in ES at Taibah University.

4. Research model

The research model, presented in Figure 2, will be applied in this research as it shows the three dimensions that will be used to evaluate the ES of Taibah University.

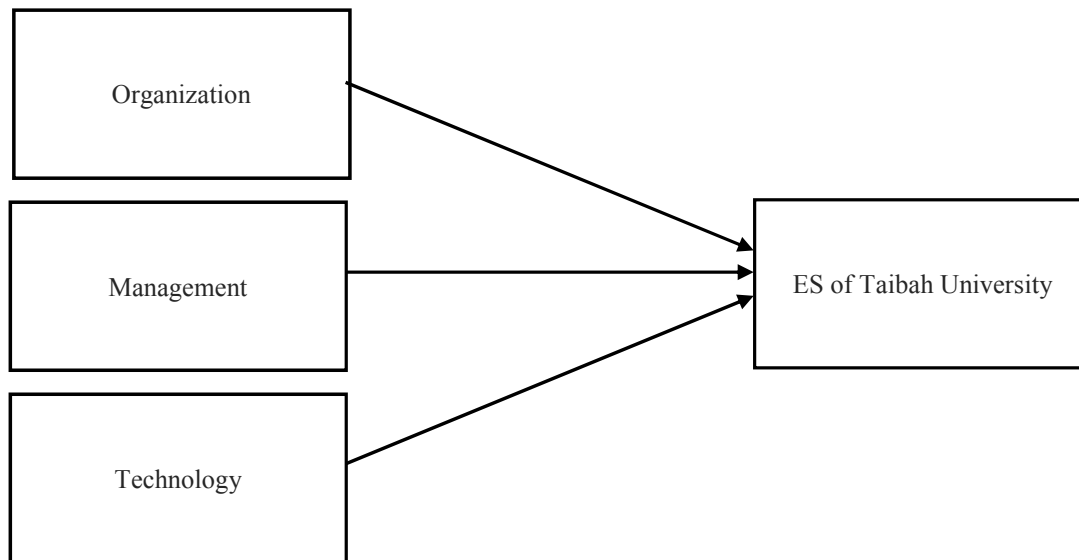


Figure 2. The research model

5. Methodology

Our population consists of faculty members of Taibah University. We used a regular random sample consisting of 150 respondents. The questionnaire was divided into four parts. Part 1 contained eight questions for demographic information. Part 2 contained 12 items that measured the first dimension, organization (OR). Part 3 contained nine items measuring the second dimension, management (MA). Part 4 contained 16 items measuring the third dimension, technology (TECH). We measured all factors using a five-point Likert scale: (1) Strongly Disagree, (2) Disagree, (3) Undecided, (4) Agree, (5) Strongly Agree. The current study applied structural equation modeling (SEM) to analyze the collected data rather than multiple regressions because SEM can provide more appropriate fit indices for the full structural model and thus superior empirical results (Hair et al., 2006).

6. Data Collection and Analysis

150 responses were collected from the survey questionnaires, which we made available online. SEM was performed using AMOS. Table 1 presents demographic information regarding the study sample. As we can see from Table 1, the majority of respondents are over 40 years old, and more respondents are male than female. Almost a quarter of respondents were from the college of business administration. Finally, most respondents had five or more years' experience working at the university.

Table 1: Participant Demographics Information

Demographic Profile	Group	Number	Percentage
Sex	Male	88	59.5%
	Female	62	40.5 %
Age	Less than 40	70	47 %
	40 or more	80	53 %
Qualification	PhD	90	60 %
	Other	60	40 %
Years of Experience	Five years or more	113	75 %
	Less than five years	37	25 %
Nationality	Saudi	70	47 %
	Resident	80	53 %
College	Business administration	35	23 %
	Other	115	77 %

7. Reliability and Validity Analysis

This study contains three variables, each of whose items we prepared using SPSS 22.0 to find Cronbach's alpha and AMOS correlation values. For values to be acceptable, each variable must show Cronbach alpha values of above 0.60, and correlations must be above 0.5 (Nunnally & Bernstein, 1994). Figure 3 and 4 show SPSS and AMOS results: the reliability values of all variables range from 0.96 to 0.975, and correlations are above 0.5.

OR Reliability test: Reliability Statistics		TECH Reliability test: Reliability Statistics		MA Reliability test: Reliability Statistics	
Cronbach's Alpha	N of Items	Cronbach's Alpha	N of Items	Cronbach's Alpha	N of Items
.960	12	.975	16	.967	9

Figure 3. SPSS Cronbach's alpha results from SPSS

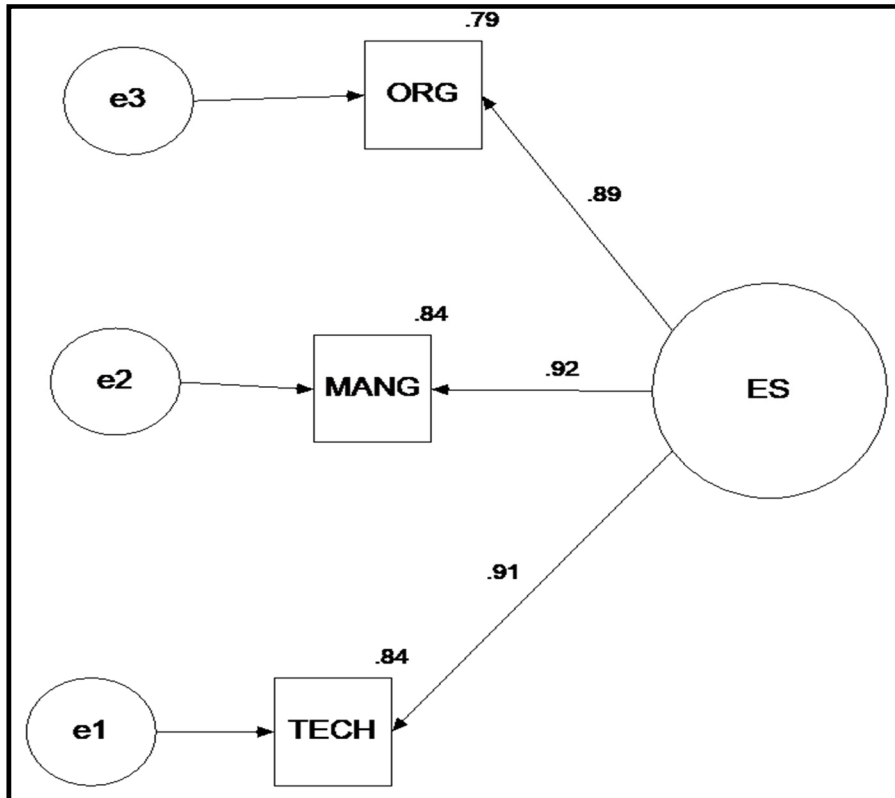


Figure 4. Correlation value results from AMOS.

Cronbach's alpha and correlation values for all items presented in Table 2, correlations are above 0.5, and all Cronbach's alphas are above 0.9. Therefore, variables have an acceptable reliability (Nunnally & Bernstein, 1994).

8. Convergent Validity Analysis

We used confirmatory factor analysis by Amos22 to investigate the convergent validity. The standards of good convergent validity are the following: factor loading > 0.7, average variance extracted (AVE) > 0.5 and combination validity (CR) > 0.6 (Hair, et al. 2010). We present the analysis result in Table 3, and the AVE and CR have been calculated manually following steps recommended by (Hair, et al. 2010). According to the result in Table 3, the AVE and CR, all the constructs meet the standards and we can say that the scales have an acceptable convergent validity (Hair, et al. 2010).

Table 2: Results of Reliability Analysis

Correlation Value of Item	Items	Cronbach's Alpha	Variable
	37	0.968	Total
0.870	OR1	0.960	OR
0.880	OR2		
0.820	OR3		
0.880	OR4		
0.850	OR5		
0.740	OR6		
0.790	OR7		
0.710	OR8		
0.820	OR9		
0.800	OR10		
0.810	OR11		
0.830	OR12		
0.880	MA1	0.967	MA
0.900	MA2		
0.840	MA3		
0.860	MA4		
0.840	MA5		
0.870	MA6		
0.860	MA7		
0.910	MA8		
0.900	MA9		
0.820	TECH1	0.975	TECH
0.810	TECH2		
0.850	TECH3		
0.900	TECH3		
0.820	TECH4		
0.900	TECH5		
0.910	TECH6		
0.890	TECH7		
0.890	TECH8		
0.930	TECH9		
0.880	TECH10		
0.790	TECH11		
0.790	TECH12		
0.930	TECH13		
0.820	TECH14		
0.740	TECH15		
0.750	TECH16		

Table 3: analysis result AVE and CR for all items

C.R	AVE	Factor loading	Items	Construct
0.9329	0.6694	0.870 0.880 0.820 0.880 0.850 0.740 0.790 0.710 0.820 0.800 0.810 0.830	OR1 OR2 OR3 OR4 OR5 OR6 OR7 OR8 OR9 OR10 OR11 OR12	OR
0.9445	0.7633	0.880 0.900 0.840 0.860 0.840 0.870 0.860 0.910 0.900	MA1 MA2 MA3 MA4 MA5 MA6 MA7 MA8 MA9	MA
0.9559	0.7330	0.820 0.810 0.850 0.900 0.820 0.900 0.910 0.890 0.890 0.930 0.880 0.790 0.790 0.930 0.820 0.740 0.750	TECH1 TECH2 TECH3 TECH3 TECH4 TECH5 TECH6 TECH7 TECH8 TECH9 TECH10 TECH11 TECH12 TECH13 TECH14 TECH15 TECH16	TECH

9. Discrimination Validity Analysis

The square root of AVE and the correlation coefficient matrix were used to test the discrimination validity of the constructs. Each construct's square root of AVE must be greater than its correlation coefficient with another construct (Hair, et al. 2010). Table 4 shows the analysis result of discrimination validity. The values in the diagonal line present the square root of AVE for the constructs; other data present the correlation coefficient of the row construct and the column construct of the data. Each construct's square root of AVE is greater than its correlation coefficient with another construct; we can say that the scales have acceptable discrimination validity (Hair, et al. 2010).

Table 4: Analysis Results of Discrimination Validity

	OR	MA	TECH
OR	0.8182		
MA	0.8180	0.8737	
TECH	0.8150	0.8390	0.8562

10. Confirmatory Factor Analysis

Next, confirmatory factor analysis (CFA) was used to determine the factor structure of our data set; in the CFA, the results confirmed that the factor structure had been extracted in the previous stage (Hair, et al. 2010). We performed CFA using AMOS for each axis (dimension):

- Figure 4 shows CFA for OR which contains 12 items that measure the first dimension. Standardized loading estimates should be 0.5 or higher, and ideally 0.7 or higher. Figure 5 shows that OR items' loading factor values were between 0.71 and 0.88, so we can say that OR had an acceptable factor loading (Hair et al. 2010).

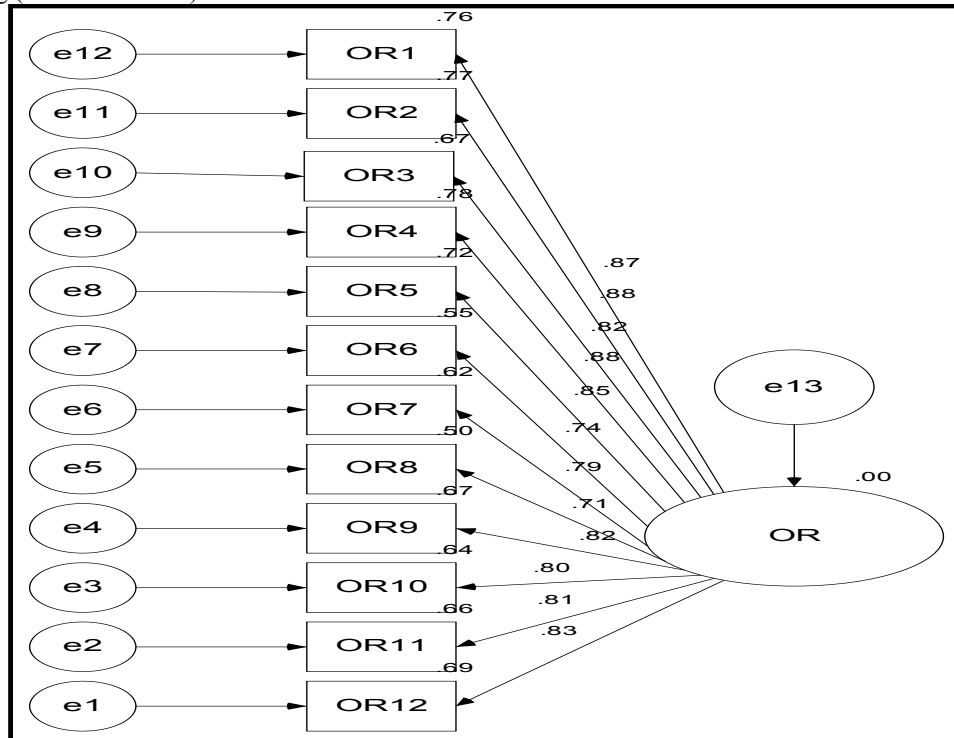


Figure 5. Confirmatory factor analysis for the first dimension

- Figure 6 shows that MA contains nine items that measure the second dimension. As shown in Figure 6, items loading values were between 0.84 and 0.91, so we can say that MA has an acceptable factor loading (Hair et al. 2010).

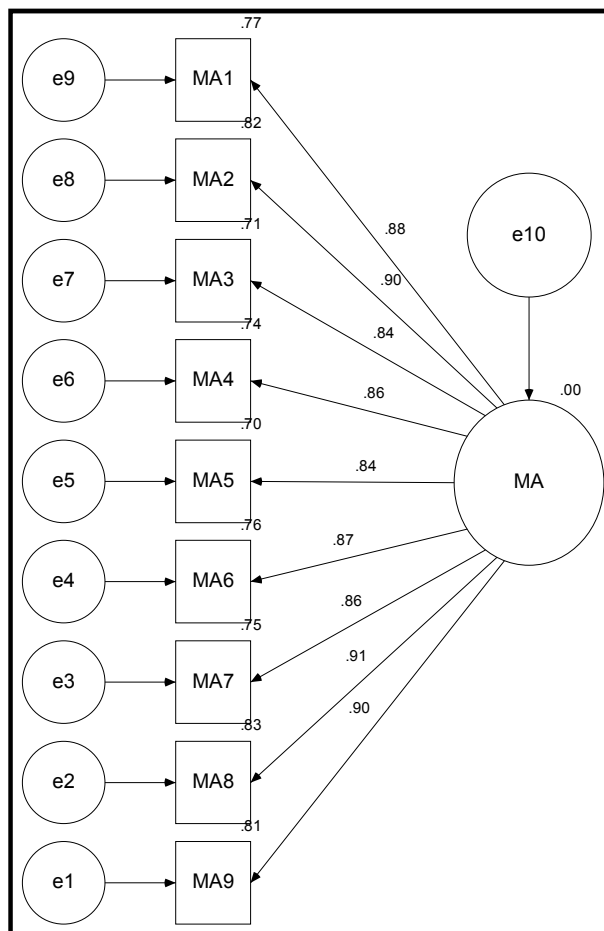


Figure 6. Confirmatory factor analysis for the second dimension.

3. Figure 7 shows the CFA results which shows that TECH contains sixteen items that measure the third dimension. As Figure 7 shows, the items' loading values were between 0.74 and 0.93, so we can say that factor loading is acceptable (Hair et al. 2010).

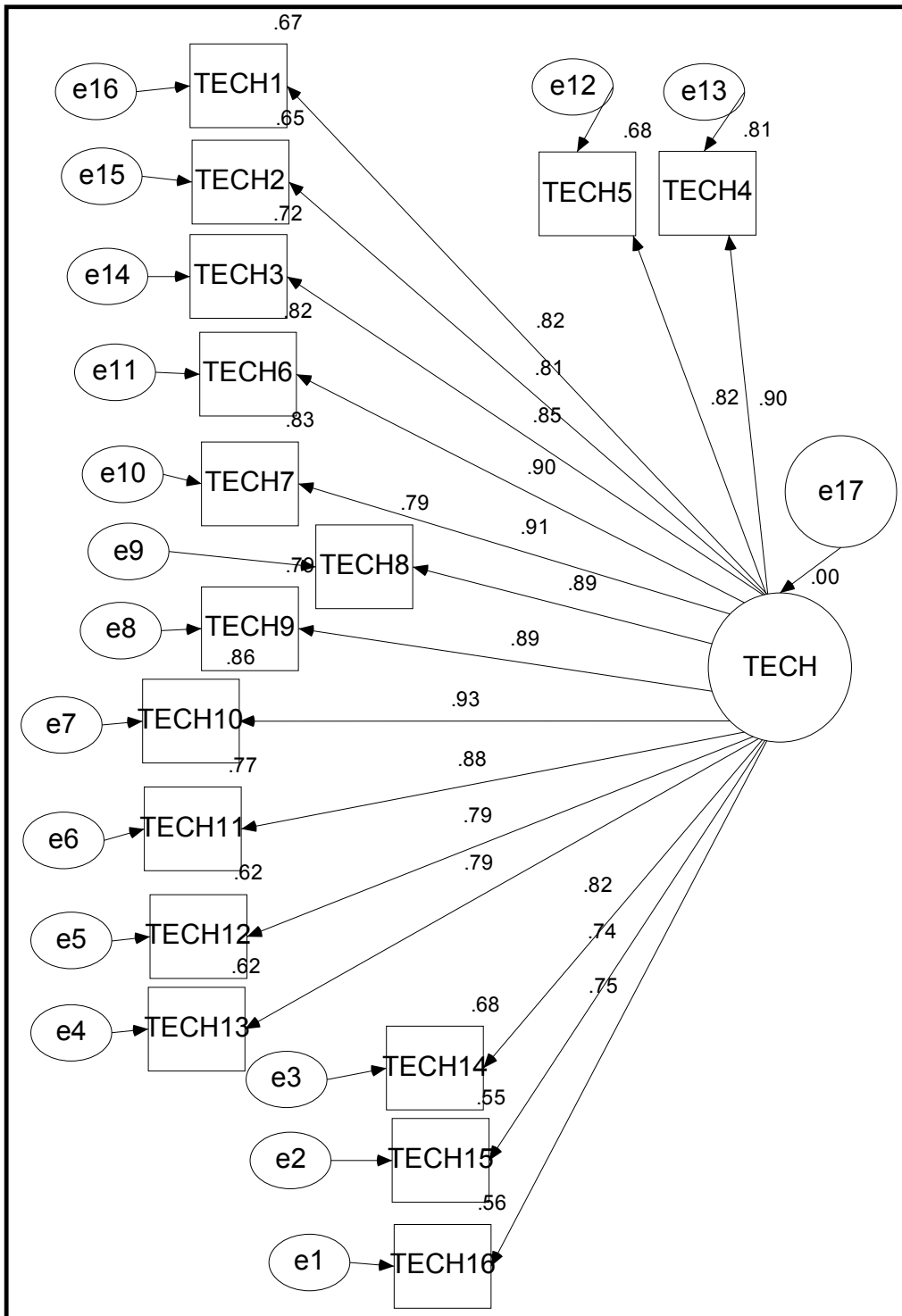


Figure 7. Confirmatory factor analysis for the third dimension.

11. Frequency Discussions

Table 5 presents the estimated Likert scale balance according to the measure of the divisions (the range = 5-1=4, divided by 5 = 0.80).

Table 5: Likert Scale Balance

Answer	Mean	General trend
Strongly disagree	1–1.80	Strongly disagree
Disagree	1.81–2.60	Disagree
Quite true	2.61–3.40	Quite true
Agree	3.41–4.20	Agree
Strongly agree	4.21 or more	Strongly agree

1. The first axis (OR): Measures the extent of support provided by ES at Taibah University for faculty members to achieve the first dimension of the information system. Table 6 shows the results of the first axis. The general trends of the responses for the first axis after calculating averages, frequencies, percentage, and standard deviation were presented in Table 6.
2. The second axis (MA) measures the extent of the support ES provided at Taibah University for faculty members to achieve the second dimension of the information system. Table 7 presents the results.
3. The third axis (TECH) measures the extent of support provided by ES at Taibah University for faculty to achieve the third dimension of the information system; the results of the third axis are shown in Table 8.

Table 6: First Axis Results

Item						Mean	Standard deviation	General trend	Comment
	Strongly disagree	Disagree	Quite true	Agree	Strongly agree				
OR1 ES reduces time needed to do academic work.	19	16	27	42	46	3.5	1.36	Agree	ES reduced the time
OR2 ES reduces effort needed to do academic work.	19	16	28	40	47	3.5	1.35	Agree	ES reduced the effort
OR3 ES provides the reports that I need in my work.	20	22	35	45	28	3.26	1.29	Quite true	some users had difficulty
OR4 ES helps to reduce errors.	18	18	21	56	37	3.5	1.30	Agree	ES helped reduce errors.
OR5 ES reduces reliance on the use of manual methods for academic work.	19	6	23	40	62	3.8	1.36	Agree	ES reduced reliance
OR6 ES provides electronic forms to obtain development suggestions from users.	28	29	35	31	27	3.0	1.37	Quite true	some users had difficulty
OR7 Reports extracted from ES meet work requirements.	28	18	39	41	24	3.1	1.33	Quite true	reports did not meet work needs
OR8 Reports extracted from ES are accurate.	15	14	27	49	45	3.6	1.27	Agree	reports extracted were accurate
OR9 ES reduces administrative burden.	18	17	37	46	32	3.38	1.27	Agree	reduced admin burden
OR10 ES speeds up grade monitoring.	18	18	19	36	59	3.66	1.4	Agree	speed up grade monitoring
OR11 ES facilitates the work of statistics to evaluate the education process.	12	14	31	42	51	3.70	1.25	Agree	ES facilitated statistics
OR12 ES helps to reduce the work of the audit committees at the department level.	17	12	32	49	40	3.55	1.27	Agree	reduce the work of the audit

Table 7: Second Axis Results

<u>Item</u>	Strongly disagree	Disagree	Quite true	Agree	Strongly agree	<u>Mean</u>	<u>Std. deviation</u>	General trend	Comment
MA1 ES provides information that helps manage college planning.	19	22	36	42	31	3.29	1.29	Quite true	some difficulties to find information
MA2 ES provides information that helps administrators organize work.	19	19	38	41	33	3.33	1.29	Quite true	some difficulties to find information
MA3 ES provides information that helps administrators assess employees.	22	22	45	37	24	3.1	1.27	Quite true	some difficulties to find information
MA4 ES helps management to follow work progress.	29	12	38	48	23	3.2	1.33	Quite true	some difficulties to follow work progress
MA5 ES provides access to employee suggestions.	31	32	39	29	19	2.8	1.33	Quite true	some difficulties to access suggestions.
MA6 ES provides the possibility of monitoring the progress of the teaching process.	24	29	31	40	26	3.1	1.34	Quite true	some difficulties to monitor the teaching progress
MA7 ES provides the ability to respond to user queries.	35	32	28	38	17	2.8	1.35	Quite true	some difficulties in responding to user queries.
MA8 ES provides information that assists managers in issuing work directives.	29	24	40	33	24	2.99	1.34	Quite true	some difficulties finding information
MA9 The powers granted by ES exceed those needed to meet business requirements.	26	31	34	37	22	2.98	1.32	Quite true	the powers granted by ES exceeded business requirements.

Table 8: Third Axis Results

Item	Strongly disagree	Disagree	Quite true	Agree	Strongly agree	Mean	Std. deviation	General trend	Comments
TECH1 ES response speed is commensurate with business requirements.	25	25	28	45	27	3.16	1.35	Quite true	ES response speed is low.
TECH2 ES's data storage potential is commensurate with increasing needs.	22	23	35	43	27	3.20	1.31	Quite true	
TECH3 ES provides the software that I need in my work.	33	31	34	29	23	2.85	1.37	Quite true	difficulties to provide needed software
TECH4 ES's design helps to get work done quickly.	31	23	32	36	28	3.04	1.40	Quite true	
TECH5 ES provides the user with sufficient time to complete the task after each logon process.	33	26	33	36	22	2.92	1.37	Quite true	ES did not provide the user with sufficient time to do tasks
TECH6 ES provides tools to help speed up work.	28	29	36	35	22	2.96	1.33	Quite true	ES did not provide tools to help to speed up work.
TECH7 ES provides the possibility of importing from supporting programs.	45	27	36	26	16	2.60	1.35	Quite true	ES does not support importing from other programs.
TECH8 ES provides the possibility of exporting to support programs.	43	24	40	29	14	2.64	1.32	Quite true	ES does not support exporting to other programs.
TECH9 ES provides a user guide that makes using the technology easy to understand.	37	28	32	33	20	2.80	1.37	Quite true	ES did not have user guide to know easily how to use.
TECH10 ES provides tools to update users on updates.	39	28	40	23	20	2.71	1.35	Quite true	ES did not provide updates for users
TECH11 <u>Technical support staff understand users' needs.</u>	<u>36</u>	<u>23</u>	<u>38</u>	<u>30</u>	<u>23</u>	<u>2.87</u>	<u>1.38</u>	<u>Quite true</u>	<u>user needs was unknown for technical support staff.</u>
TECH12 <u>ES's technical flaws can be reported electronically.</u>	<u>40</u>	<u>25</u>	<u>35</u>	<u>32</u>	<u>18</u>	<u>2.75</u>	<u>1.37</u>	<u>Quite true</u>	<u>some difficulties to report technical flaw.</u>
TECH13 <u>The ES technical flaw is fixed quickly.</u>	<u>35</u>	<u>19</u>	<u>46</u>	<u>33</u>	<u>17</u>	<u>2.85</u>	<u>1.37</u>	<u>Quite true</u>	<u>fixing ES technical flaws was slow.</u>
TECH14 The technical support team will respond to the users' queries at any time during working hours.	32	24	39	37	18	2.90	1.31	Quite true	responding to users' queries during work can be difficult.
TECH15 The capabilities of the users' computers are commensurate with the requirements of ES.	28	16	36	42	28	3.17	1.36	Quite true	not fully commensurate with the requirements
TECH16 The capabilities of the existing network are commensurate with the business needs of ES.	29	20	34	41	26	3.10	1.36	Quite true	not fully commensurate with the business needs

12. Discussion and Conclusion

Survey respondents almost unanimously responded positively regarding the first dimension (organization) for ES which is provided by Taibah University. Thus, the support ES provided to faculty members at Taibah University achieved the basic functions of the university and its activities, except for the fact that some users had difficulty in retrieving reports as well as some of the reports did not meet the work needs. Therefore, we recommend that ES improve reporting and user suggestions procedures.

Regarding the second dimension of information system (management), opinions varied based on a survey of respondents. However, the extensive support that ES provided at Taibah University to faculty members does not achieve organizational goals such as planning, guidance, and supervision, so we can say that ES needs to be improved in this area. Our recommendation here is that higher management must set the organizational strategy for responding to those challenges and that they must allocate the human and financial resources necessary to coordinate the work and achieve success while exercising responsible leadership throughout the process.

With regard to the third dimension of information systems (technology), survey respondents' opinions varied. However, ES's support at Taibah University for means, methods, tools, and programming systems that the college needs, does not achieve its objectives. As a result, we recommend improving ES in the area of information technology, including computer hardware, infrastructure used for input, processing, output, storage option, and telecommunications devices.

This evaluation clearly shows that ES achieves the minimum with respect to the first information system dimension (organization) but fails to do so with regard to management and technology. These results are consistent with those from previous studies, such as Al-Shaya & Oyaid (2015). Regarding our research's second objective that is mentioned in the research problem section, we can say that to the first information system dimension (organization) is the most influential dimension of ES at Taibah University. In conclusion, we hope to integrate this research with the work of Petter et al. (2008) to contribute to the creation of comprehensive, replicable, and informative measures of IS success.

This research applied to the Taibah University, can be used in all the emerging universities in Saudi Arabia, which is similar in terms of potential, and we hope that this contributes to the development and improvement of the educational system of those universities.

13. References

- Al-Otaibi, M. B., & Al-Zahrani, R. M. (2003). *E-commerce adoption in Saudi Arabia: An evaluation of commercial organizations' web sites*. Paper presented at the CITA, city, country.
- Al-Shaya, H. M., & Oyaid, A. A. (2015). The use of Google+ in project-based learning with students of Princess Nourah University and their satisfaction towards IT. *International Interdisciplinary Journal of Education*, 4(1).
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Upper Saddle River, NJ: Prentice Hall.
- Laudon, K. C., & Laudon, J. P. (2012). *Management information systems: Managing the digital firm* (12th ed.). Prentice Hall: Pearson.
- Liaw, S.-S. (2008). Investigating students' perceived satisfaction, behavioral intention, and effectiveness of e-learning: A case study of the Blackboard system. *Computers & Education*, 51(2), 864–873.
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed). New York: McGraw-Hill.
- Petter, S., DeLone, W., & McLean, E. (2008). Measuring information systems success: models, dimensions, measures, and interrelationships. *European Journal of information systems*, 17(3), 236–263.
- Sedera, D., & Gable, G. (2004). A factor and structural equation analysis of the enterprise systems success measurement model. *ICIS 2004 Proceedings*, 36.