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THE IMPACT OF ERP APPLICATION ON EMPLOYEES' PERFORMANCE AND WORKING PROCESS AGILITY IN HIGHER EDUCATION SECTOR

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Abstract

This research studies the influence of ERP application systems (ERP) on the performance of administrative staff and the development of professional abilities. We note that more research in this area looked at the effects of ERP systems on the relationship between the different interests and administrative functions and they didn't study the performance and efficiency of the employee during doing work. From this perspective, it was essential that we hire a cross-sectional field study, analysis and exploratory case study of the administrative staff of Umm Al Qura University. Thus, the aim of the study as well as to highlight the distinctive features of the institution in light of systems integration and application of information and functional role (ERP) in improving employee performance. The target population for this study was higher education sector employees of Saudi Arabia among which 100 employees were taken for data collection through questionnaire. The results showed that there is a positive and significant relationship between decision support system (DSS), management of change and development (MCD), operations reengineering, and quality (ORQ) and employees' performance defined by project team competence and organization (PTCO).

Keywords: **ERP; Professional Abilities; Performance; Efficiency; Administrative Staff; Decision Support System**

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INTRODUCTION

The implementation of ERP systems adopted by international and local organizations to make face too many changes and challenges, whether they are industrial or service organizations is growing ascending. These challenges have led to the emergence of new concepts in the management of organizations that seek to achieve the goal of survival and continuity in the world of competition. Although, to attend their objectives, many organizations begin by changing their traditional methods that are not appropriate with the challenges trend and set up modern management concepts to ensure the best performance level, Barker and Frolick [1]; Arnold [2]; Galliers [3]; Gartner Research [4]; Raissi, Hakeem [5]. Using ERP package by organizations is efficient and effective. It has become increasingly important for these organizations to play a crucial role in the development of organizations, providing all suitable information at the most appropriate time for different administrative levels. Improving and developing communication and information flow between these levels, all of which would positively reflect on their overall performance, Ketokivi [6]; Lee et al. [7]; Tallon and Pinsonneault [8], Goodhue, et al. [9]. Moreover, the system which integrates many functions in the same time gives more interesting and significance to users of IT. The main problem is how to manage the ERP and to attend the common objective of any organization. A several authors focus about critical success factors of ERP.

The review of their studies gives eight factors which presented the most significant in this way. These factors are: decision support system, project team competence and organization, user training and education, operations reengineering and quality, the management of change and development, effective communication, user involvement, analysis, conversion and storage of information. The determinants of ERP help to clarify the utility of this system and the perspective of enterprise agility through their employees, Mooney and Ganley [10]; Li, et al. [11]; Peng and Nunes [12]; Prahalad [13]; Uwizeyemungu and Raymond [14]; Schubert and Williams [15]; Schlichter and Kraemmergaard [16]; Lu and Rammurthy [17]; Tallon and Pinsonneault [8], Grabski et al. [18]. Also, in the first way, the study aims to investigate how the ERP determinants can affect positively the employees' performance (H1). In the second way, the changing incited by ERP led to improving organizational management (H2). These hypotheses give a clear idea about the main problematic of our research.

RESEARCH METHODOLOGY

The purpose of this research is to define the different steps and methodological approach applied in order to have relevant, reliable and valid statistical analysis which will verify the relationship between ERP application and employee's performance.

Furthermore, to determine the sample of study, we have used a questionnaire delivered online to 200 employees from Umm al Qura University at Saudi Arabia. The investigation by questionnaire was conducted in two parts, the first part about demographic data, such as working class, gender, education level, etc., and the second part is devoted to test the impact of each success factors that presented ERP application and employees performance. Also, to define a measure of developed model criteria, we chose the "Likert scale". According to Evrard [19]; Yin [20], the Likert scale is one of the best known in the opinion surveys. It is an indicator devoted to measure the attitudes of respondents. The tool of data collection defined by a questionnaire that integrated a scale from a series of opinions on the same subject for which it should express more or less agree (disagree) by choosing between five possible answers (from Strongly disagree to Strongly agree). Likewise, in the first step, we provide coding questions presented the criteria and an item of each constructs that defined global model and to make easy the data analysis by software. In the second step, we manage the data collected, which allow us later to input data into tables within SPSS software. The statistic application helps us to use the means of data analysis and to do exploratory factor analysis for validation of measures scales (Items). Therefore, the analysis of our sample used exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) presented a multitude of structural relations path that gave rise to different results through Structural Equation Model (SEM) which analyzed by SmartPLS.

RESULTS AND DISCUSSION

The sample of study incorporates 100 employees from Umm al Qura University in Saudi Arabia. The employees represented 18 departments and defined by 75% managers. The education level showed that around 67% hold undergraduate degrees for different category (manager, assistant manager, general manager, and engineer). The Respondents are divided to 75% males versus 25% females. The analysis began by define the perception of employees to the real added value or contribution of ERP implementation in their university.

The results give a diversity of responses and clarify the degree of employees' satisfaction. We find that 90% of respondents used in their work ERP application, and around 90% of them used this ERP application from 2 years to 5 years. The employees executed 60% of administrative operations by ERP application. The descriptive analysis gives little information about the problematic discussed in our research. To validate our hypotheses and the model of research, the approach issued from two parts.

The first part consists to the validity of measurement scale with exploratory factor analysis method (EFA) and the second part is about the validation of constructs and global model with confirmatory factor analysis (CFA). Although, to validate items, the reliability test with coefficient of Cronbach Alpha was used, the normality tests by Skewness and Kurtosis coefficients, and Total Explained Variance. Also, the Table 1 below shows the main results obtained after reliability and validity tests. The results showed that all of variables accepted with different level and all of them exceed the thresholds required 70% of reliability test with Cronbach's Alpha. The test of normality

proved that all of items between [-3, 3] with Skewness and Kurtosis tests. Moreover, the coefficient Total Variance Explained (TVE) exceed 50% and the items retained were defined as follow: 3 items presented the variable ACSI, 2 items of DSS, 3 items of EC, 3 items of MCD, 4 items of ORQ, 4 items of PTCO, 2 items of UI, and 1 item of UTE.

Table 1: Exploratory factor analysis for measurement scales.

Variables	Code	N of Items retained	Cronbach's Alpha	KMO and Bartlett's Test Kaiser-Meyer-Olkin Measure	Bartlett's Test (Sig.)	Total Variance Explained (Cumulative %)
Analysis, conversion and storage of information	ACSI	3	0.851	0.828	0	51.129
Decision support system	DSS	2	0.758			
Effective communication	EC	3	0.814			
Management of change and development	MCD	3	0.904			
Operations reengineering and quality	ORQ	4	0.815			
Project team competence and organization	PTCO	4	0.817			
User involvement	UI	2	0.69			
User training and education	UTE	1	0.836			

For the confirmatory factor analysis, to test strengthen correlation between criteria and constructs, the analysis should follow the structural equation modelling (SEM). This method focus in two approaches, the first about analysis of latent variables and the second about structural model. In our case, the test of reliability and validity of constructs as presented in Table 2 showed that exist 22 items which presented 8 constructs.

The internal consistency reliability with Cronbach's alpha which used as an estimate of the reliability of a psychometric test demonstrated that there is a high inter-correlation between measurement scales of each constructs. All of them exceed the threshold 7%, and the consistency was approved. These findings reveal that the internal consistency of all items is high and there are a very strong correlation between items and their

constructs. Moreover, the examination of convergent validity and the discriminant validity by using the Average Variance Extracted (AVE) as a criterion of convergent validity showed that all of constructs exceeded the threshold of 50%. This rate indicates that exist a sufficient convergent validity.

Table 2: The reliability and validity of constructs.

Constructs	Code	N of Items	Cronbach's Alpha	Jöreskog's Rhos	Average Variance Extracted (AVE)
Analysis, conversion and storage of information	ACSI	3	0.751	0.856	0.666
Decision support system	DSS	2	0.761	0.891	0.804
Effective communication	EC	3	0.814	0.878	0.707
Management of change and development	MCD	3	0.905	0.939	0.837
Operations reengineering and quality	ORQ	4	0.816	0.878	0.644
Project team competence and organization	PTCO	4	0.716	0.82	0.534
User involvement	UI	2	0.69	0.863	0.76
User training and education	UTE	1.00	1.00	1.00	1.00

The multicollinearity test of Manifest variables in a formative block is calculated by the variance inflation factor (VIF). In our case, all of VIF values are between 2.505 and 4.233 as presented in Table 3, (1<VIF<10). The multicollinearity of formative indicators was approved and there are not highly collinear formative indicators. Then, the total formative indicators in studied model are statistically significant.

Table 3: The inner VIF values.

	ACSI	DSS	EC	MCD	ORQ	UI	UTE
PTCO	3.566	2.505	3.133	4.233	3.280	3.048	2.728

In our case, the R^2 of endogenous latent variables is near 0.66, and the R square adjusted was 0.63. The p-value of each coefficient was 0.000 and the PTCO as endogenous variable of structural model was statistically significant (Table 4).

Table 4: The R Square and R Square Adjusted of endogenous latent variable: Project team competence and organization (PTCO).

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
R^2	0.656	0.684	0.051	12.912	0.000
R^2	0.630	0.660	0.055	11.521	0.000

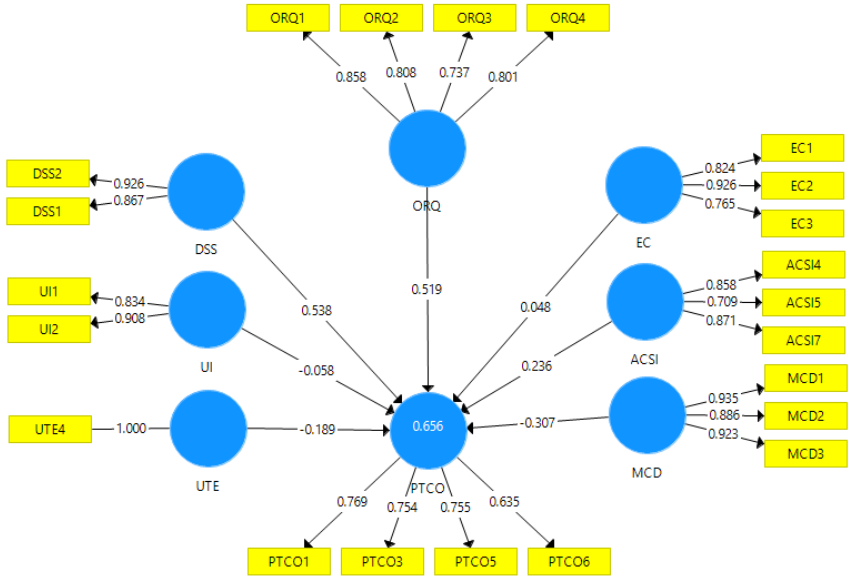
According to Table 5, the estimates of Path coefficients presented 3 significant relationships. These correlations were between DSS, MCD, and ORQ as factors of ERP application and PTCO as determinant of employees' performance (Decision support system, Management of change and development, Operations reengineering, and quality and Project team competence and organization). All of p-values were less than 5% the required threshold with consecutively 0.000, 0.028 and 0.000 (Table 5).

Table 5: The estimates of Path Coefficients (Mean, STDEV, T-Values, P-Values).

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
ACSI → PTCO	0.236	0.223	0.140	1.692	0.091
DSS → PTCO	0.538	0.534	0.101	5.326	0.000
EC → PTCO	0.048	0.064	0.116	0.415	0.678
MCD → PTCO	-0.307	-0.304	0.139	2.207	0.028
ORQ → PTCO	0.519	0.537	0.110	4.702	0.000
UI → PTCO	-0.058	-0.066	0.095	0.617	0.537
UTE → PTCO	-0.189	-0.193	0.116	1.626	0.104

Also, the structural model with estimated parameters which describes more this causality path between endogenous and exogenous constructs was presented in Figure 1.

Figure 1: The structural model with estimated parameters.



The criterion used to test the global model was f2 (the effect of size) as presented in Table 6. This coefficient should have the values 0.35, 0.15, and 0.02 indicate large, medium, and small effects respectively. The obtained results presented in Table 6 showed that exist in our case a significant relationship between DSS → PTCO and ORQ → PTCO. This result means that there is a stronger effect between DSS and ORQ as exogenous variables and PTCO as endogenous variable.

Table 6: Effect size f square.

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
ACSI → PTCO	0.046	0.062	0.062	0.732	0.465
DSS → PTCO	0.336	0.356	0.151	2.226	0.026
EC → PTCO	0.002	0.021	0.034	0.063	0.950
MCD → PTCO	0.065	0.088	0.081	0.805	0.421
ORQ → PTCO	0.239	0.265	0.111	2.164	0.031
UI → PTCO	0.003	0.012	0.017	0.193	0.847
UTE → PTCO	0.038	0.059	0.064	0.596	0.551
*p-value<5% (sig)					

In general, the validation of global model should go through reflective and affective constructs analysis. According to Table 7, the saturated and estimated models were

statistically significant with p-value 0.000. In our case, the value of SRMR is less than or equal to 0.10 and it is considered a good fit.

Table 7: The SRMR coefficient.

	Original Sample (O)	**Sample Mean (M)**	**Standard Deviation (STDEV)**	**T Statistics (|O/STDEV|)**	**P Values**
Saturated Model	0.109	0.063	0.007	15.715	0.000
Estimated Model	0.109	0.063	0.008	13.443	0.000

The findings obtained approved the hypotheses H1 and H2 which claimed respectively that the ERP determinants can affect positively the employees' performance (H1) and the changing incited by ERP led to improving organizational management (H2). These results support the studies of Mooney and Ganley [10]; Li et al. [11]; Peng and Nunes [12]; Prahalad [13]; Uwizeyemungu and Raymond [14]; Schubert and Williams [15]; Schlichter and Kraemmergaard [16]; Lu and Rammurthy [17]; Tallon and Pinsonneault [8].

CONCLUSIONS AND RECOMMENDATIONS

The study sought to deepen the knowledge of ERP implementation in Universities and to clarify the close relationship between it and the overall performance of employees. We have concluded that universities are already employing information systems but not enough to be an additional cost to them. That the tasks entrusted to the simple is almost limited to the maintenance of hardware and software, and we found that the university have some of the latest technologies of information and communications, such as computers, programs and networks, but the training programs for its workers are few in this area, and we found that most departments have ERP application.

These departments have databases that operate in them but only for certain activities. We also found that there is a significant correlation between the use of ERP application and the overall performance of employees, where the success factors of ERP as decision support system, management of change and development, operations reengineering, and quality contributes to improving administrative performance defined by project team competence and organization. In our case, this correlation proved through providing the comprehensive and timely information to decision makers in order to develop appropriate strategies; make decisions properly; manage organization, planning operations and control.

Moreover, the ERP application contributes to improved job performance in university because it leads to save time, effort, reduce errors, support teamwork, improve employee satisfaction, increase their productivity and reduce paper handling. However,

the use of ERP application is not free of the risks and obstacles that prevent its optimal application. We have concluded that the policies and plans of university in this field are not clear, and there are a few human competencies in this field. Also, in the light of the conclusions made, the following recommendations were reached; the universities should enhance involvement of their employees to many training programs about using ERP application. The continuous improvement to update data and administrative procedures which have relation with ERP application. The commitment of top manager and empowerment of specialized employees in IT field.

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