Development of Extended Enterprise Resource Planning Module for Higher Education of Pakistan: A Case Study of Higher Education

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***Abstract* - We investigate the introduction of a customized Enterprise Resource Planning, ERP, software for higher education institutions in Pakistan specifically and across the globe generally. We explore the impact of ERP in a well-known university in Pakistan. A survey is carried out across the university's relevant stakeholders to explore the impact that the customized Campus Management System has. We explore the shortcomings of existing ERP systems in the Higher Education sector and ways to mitigate them. The model proposed is influenced by IS Success Model of DeLone & McLean. The constructs of the research, after data collection, went through Confirmatory Analysis. The positive results were acquired through skewness and kurtosis. The Structural Equation Modelling, SEM, results also proved positive with significant correlation among the variables. Our findings showed that Instructor Quality, Course Quality, and Top Management Support have significant impact on ERP system quality and subsequently increase ERP user perceived usefulness and satisfaction. Our results are aimed at those who have been utilizing the conventional ERP system and have been struggling with their shortcoming, as well as those universities who have been in the process of selection of ERP system.**

Keywords* - *Campus Management System, Enterprise Resource Planning, ERP Customization, Instructor Quality, Course Quality, Top Management Support, Information quality, System quality, Perceived usefulness, User satisfaction

I. INTRODUCTION

The primary emphasis of this research is the utilization of Enterprise Resource Planning (ERP) systems in academic institutions in Pakistan. Enterprise Resource Planning (ERP) system is consisted of interconnected applications so that functions can be managed effectively. Different dimensions of operations ranging from product planning to its marketing and sales can be managed through a single database through ERP system. The proper implementation and utilization of ERP system results in effective handling of data of the organization which ultimately paves the way of substantial competitive advantage [22]. This explains to a great extent why so many institutions, organizations, and companies have been getting interested in implementing ERP systems. Through quite successful in the corporate sector, the ERP systems are largely failed in meeting the requisites of Higher Education Sector. The reason being, the educational institutions have academic requirements which are different from those of corporate organizations.

It has been observed that ERP installed in one of the state-of-the-art universities of Pakistan, university is unable to meet the requirements of an academic institution from an ERP system. The major reason of the low utilization of the existing ERP system is the lack of essential modules. Research conducted by [3] also highlighted the issues faced by a HEI using the conventional ERP system. Research conducted by (Singh & Arora, 2018) reveals that the main purpose of ERP systems not being able to fulfil the needs of HEIs is that they are primarily designed for corporate organizations.

Because of this reason university had been facing several issues despite having an ERP software implemented. These issues range from absence of proper mechanism for the allocation and management of Teaching Assistants to the management of the critical events such as Convocation ceremonies and other events. Managing the Students Election Process is another challenge faced by the concerned departments of the university. In most of these issues administration of the university has been suffering from inconvenience. [17] in his research also focused on different aspects of administration of a university and highlighted how ineffective ERP system can create hurdles in the timely accomplishment of tasks. Furthermore, [3] in their research highlighted several needs ranging from educational to organizational which remained unmet due to conventional ERP systems.

In order to resolve these issues, what actually required was to develop an ERP system that comprises all the missing applications and will work in synchronization with the currently implemented ERP software to suit best to the requirements of the university.

This research study focuses on the requirements of ERP systems in academic Institutions. As a result of its findings on how university implemented the extended version of ERP software. The direct impact of this implementation was of course for that university. However, other universities of Pakistan can also take advantage out of this case study. HEIs of Pakistan can also go for incorporating the additional modules of ERP software into their existing software.

II. LITERATURE REVIEW

A. Enterprise Resource Planning (ERP) System

The ERP system takes care of an organization's information processing mechanism by providing integrated solutions. By facilitating the flow of information, an ERP system contribute vital role in increasing efficiency of an organization in processing and using data [4]. Considering the importance of an ERP system, [20] declares it as "one of the most significant developments in the corporate use of information across 1990s".

B. ERP in Higher Education Institutions

Research studies have shown that despite a number of benefits of utilization of ERP system, experience of higher education institutions shows that there are several needs of such institutes which remain unmet. These needs were of different natures i.e. organizational, educational, functional etc. [1]. Therefore, it was needed to develop a kind of system that could fulfil the requirements of educational institutions especially universities. For that purpose, it is need of the hour to come up with customized ERP software which could include all the missing components of current ERP software. The extended ERP Software will work with the existing implemented ERP Software to suit the nature of educational institutions. However, there are certain issues with the process of customization of ERP systems i.e. high cost, scope changes, functional complications etc. [20]. Furthermore, as ERP system was initially developed for the corporate world, therefore, utilization of ERP systems has a tendency to adopt the business-like approach. Due to this behavior of employees get changed. Another point for the failure of the ERP implementation in HEIs is the technical limitation [3].

A research [17] stresses on the administration of the higher education institution to implement the ERP system. It is not necessary that the ERP system implemented in the corporate sector will be sufficient to cater to the specialized needs of the universities.

To meet the requirements of educational institutions, ERP systems are required to have extra features. These features may not be of any use to the corporate world. However, education institutions have specialized needs which are to be addressed. The specialized needs of academic institutions differentiate them from any other kind of organization [3].

C. Case Studies of ERP Implementation in HEIs

The current research study focuses on ERP implementation in HEIs i.e. universities. Several past research studies focused on addressing ERP implementation in the context of HEIs. Research conducted by [3] collects data from the universities of UAE. For that matter, this research takes a case study of one university of UAE which was established in 1998 and has the credit of preparing a good number of students as leaders in their fields. The findings indicated that departments of the universities are not fully integrated and not completely synched, adoptions of manual process have also been consuming too much of time, lacking proper information of ERP system since it has never been implemented in the university. Another research carried out by [22] focused on the universities of Saudi Arabia. The research study explored the elements of ERP system which related to the needs of HEIs. The research found that the functionalities of ERP systems suited best to the requirements of the corporate sector organizations. The study proposed to customize the ERP systems and to address the academic requirements.

D. Technology Adoption Model (TAM)

This research focuses on two different models. The first one is Technology Acceptance Model (TAM). TAM focuses on perceived usability and perceived ease of use so as to make sense of adopting the technology (Stair & Reynolds, 2009). TAM has been quite useful in understanding the use of technology. Resistance created by individuals, in this instance, is another area which is needed to be studied.

The Technology Acceptance Model was propounded by [6]. The model revolves around exploring the aspects of acceptance of technology.

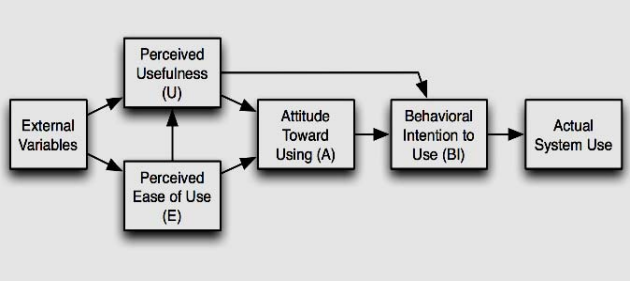

Figure 1. Technology Acceptance Model [6]

E. DeLone and McLean Model of IS Success

The model proposed by [7] seems to be an appropriate option and the research adopts the same along with TAM. The main focus of the DeLone and Mclean Model was frameworks of IS success. The model compares different frameworks and reaches up to identifying critical success factors [7]. The initial model proposed by DeLone & McLean [7] is as follows:

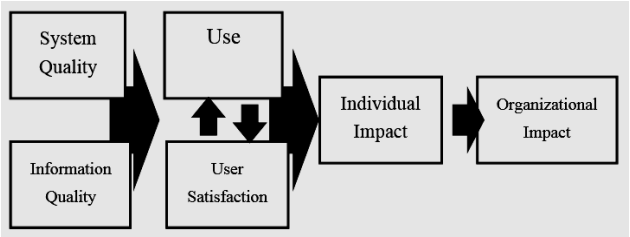

Figure 2. DeLone and McLean IS Model of Success [7]

The model classified the critical success factors into 6 different dimensions. Different variables which are interconnected to each other also get identified by the model [7].

F. Proposed Model

Following model is proposed by this research which is inspired by the original DLone & McLean's Model. The model shows the research variables (both Independent and dependent) along with the correlations among variables:

1. Instructor Quality
2. Course Quality
3. Top Management
4. System Quality
5. Information Quality
6. Perceived Usefulness
7. User Satisfaction

The independent variables are Instructor Quality, Course Quality, and Top Management. The dependent variables are Information Quality, System Quality, Perceived Usefulness, and User Satisfaction. Further defining the status of dependent variables, the variables of System Quality and Information Quality are intervening variables.

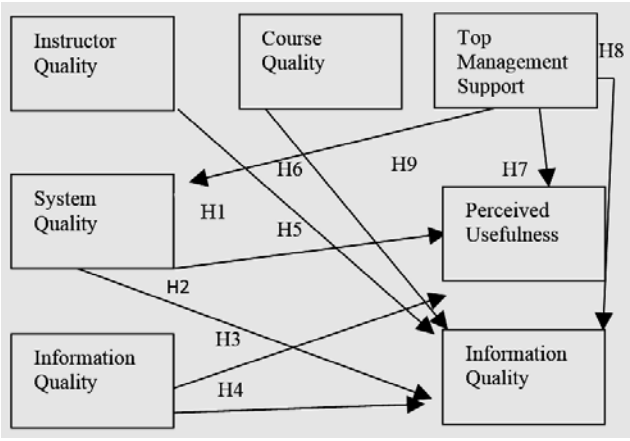

Figure 3. Proposed Conceptual Model [6]

TABLE I. HYPOTHESES

Hypotheses	Proposed Relationship
1	System Quality □ Perceived Usefulness (+)
2	System Quality □ User Satisfaction (+)
3	Information quality □ Perceived Usefulness (+)
4	Information quality □ User Satisfaction
5	Instructor Quality □ positively impacts User Satisfaction (+)
6	Course Quality □ User Satisfaction (+)
7	Top Management □ User Satisfaction (+)
8	Top Management □ Perceived Usefulness (+)
9	Top Management □ System Quality (+)

III. RESEARCH METHODOLOGY

The study focuses on exploring the impact of the customized ERP system for the selected Higher Education Institution. The researcher adopts quantitative research design, a survey method with questionnaires will be provided to the participants from the university. The primary data of the research is gathered. The data will be analyzed quantitatively.

The researcher select an institution based on the implementation of the current customized ERP system at the Higher Education Institution of Pakistan. The population of the study consists of 120 faculty members and 3800 students from 7 different faculties; 1) Department of Accounting and Law 2) Department of Economics & Finance 3) Department of Management 4) Department of Marketing 5) Department of Social Sciences 6) Department of Computer Science, and 7) Department of Mathematical Sciences.

The samples are students and faculty members. The numbers of participants who will participate in the survey are 200 students and 100 faculty members. Both students and faculty members are concerned people who know the areas where the existing ERP modules have successfully been meeting with the expectations. The students who enroll in different programs and faculty members who teach at different departments.

The researcher will employ the data screening before analyzing the data by using the Confirmatory Factor Analysis (CFA) and Structural Equation Model (SEM). The procedures and statistic will be used as follows:

Data screening is the way toward guaranteeing the data is perfect and all set before the research direct further measurable investigations. Data must be screened so as to guarantee the data is ready to be used, solid, and legitimate for testing causal hypothesis. In this area, the researcher will

concentrate on six explicit issues that should be intended to when cleaning the data.

When the researcher acquires a data, need to be really vigilant that there should not be any response that does not fall in the normal distribution. This abnormality in the data is called skewness. For example, while acquiring the data related to the impact of the ERP implementation, one needs to be really careful about those who have never used ERP system and are oblivious towards it. The skewness value of +1 denotes positive skewed while -1 represents skewness of negative nature.

Height and sharpness of the focal pinnacle is explored by Kurtosis, comparative with that of a standard bell curve. The qualities for asymmetry and kurtosis between - 2 and +2 are viewed as worthy so as to demonstrate typical univariate appropriation. Master statistics bundles, for example, SPSS report a measurement known as standard mistake for both the skewness and kurtosis scores. This enables a straightforward dependable guideline to be implemented. On dividing one of both the scores by its standard error and the outcome is more prominent than ±1.96, it proposes that your data are not typical as for that measurement.

Muliticollinearity is the result of high correlations between the research variables. This means, one can predict result of one variable from the result of the other. Multicoloinearity can be identified through Correlation Coefficients of the pairs of variables. +1 or -1 value of r means perfect Multicollinearity.

There are three areas have to be considered; Inadequate amount of data to resolve issue, Variables being incorrectly used, and Use of two similar variables.

Confirmatory Factor Analysis is commonly used for finding out the correlations between variables. It is also used for identifying the existing latent constructs. Before testing the hypotheses, the researcher may also adopt empirical research and may use knowledge of theory.

It is the validity of hypothetical including building factors to be estimated. An instrument is referred to have construct validity if the things are organized in a way of instruments to gauge each part of thinking about a variable to be estimated using these instruments. Construct validity testing of the instrument is once in a while done among students, however is regularly done to test the validity of the criteria.

A survey that is able to correlate with other instruments positively is said to have convergent validity. For producing convergent validity, Bivariate correlation analyses may be adopted. The other commonly used methods include Pearson's r and Spearman's rho.

If composite or subscale scores reflect significant correlation, then the presence of convergent validity is assumed between them. The value 0.3 of convergent validity coefficient is considered acceptable.

The average variance extracted (AVE) and the composite reliability coefficients (CR) are connected to the measurement quality. the equations of the AVE and CR should be adequately comprehended. The study will adopt simulated one-factor models to check the influences on the results of AVE and CR.

Goodness of fit model is adopted for values based of prediction. it refers to the evaluation of the degree correlation exist between a group and the actual observations.

Structural Equation Model (SEM) is adopted to set the sample size of this research. the SEM is best in analyzing the structural relationship between variables and the constructs. It also shows the connection among the constructs as well by testing the causal relationship. Structural Equation Model is quite famous for research studies in the area of social sciences as it is best at measuring correlation between constructs which are unobserved. An example of unobserved construct is human intelligence while distance or speed can be observed.

Furthermore, as per the findings, Cronbach's Alpha value of the three independent variables which are Top Management Support, Instructor Quality, and Course Quality have been recorded 0.796. This, according to the Cronbach's Alpha Criterion lies under the category of 'Acceptable'. Therefore, it can be said that Top Management Support, Instructor Quality, and Course Quality have played critical role in meeting the needs of the subjected academic institution.

IV. FINDINGS AND DISCUSSION

A. Characteristics of Respondents

Respondents in this study consisted of 300 people where 100 of them were faculty staff and the remaining 200 people were students who used the ERP system. The respondent asked to answer quistionare in this research, and the result are presented.

B. Respondent's Characteristics

Same characteristics information of respondent including departement that they worked, their gender, age, and their eduaction qualification. The majority of respondents are user (student and faculty staff) at computer science department which is 80 persons or 26.7% from all of respondents in this research. Male user dominated in this research with 204 person or 68.0% from all of respondents in this reserach. Most respondents aged 18 to 25 years, while respondents with age more than 50 years were very few in this study as many as 31 people, this shows that the user who use ERP product dominated by young user that maybe in bachelor degree. The result was linier with respondent's qualification information that show almost half of respondent are graduate.

C. Skewness and Kurtosis

Before SEM analysis is conducted, the assumption test that underlies the SEM model : normal multivariate is tested. Testing multivariate normal assumptions is done by using the Skewness and Kurtosis ratio which is calculated by using AMOS 24.0. Multivariate normal assumptions are met if the CR value in the skewnes and kurtosis test statistics is less than 2.58.

Based on the test results the CR value in the skewnes and kurtosis test statistics is 25.933. CR value more than 2.58, so it is assumed that multivariate normal assumptions are not met, but when referring to the Central Limit Proposition theory which states that observational data with a sample size greater than 30 then it is close to normal distribution, so in this research by using 100 sample/data can be considered to be multivariate normally distributed.

D. Multicollinearity Assessment

The problem of multicollinearity occurs when a higher correlation between two or more independent variables of a research model. In order to measure a potential multicollinearity between the variables in this study, the determinant of SEM covariance matrix was calculated. the presence of multicollinearity is indicated through the determinant value of the covariance matrix which is close to zero, whereas high collinearity is indicated by a covariance matrix of zero [5]. The Table II, opposite, shows variables of the research and their respective scores.

E. Discriminant Validity

The result given in Table III, opposite, showed the values estimated through square root AVE and correlation among construct for measuring discriminant validity. All of contruct variables have square root AVE values more than their correlation with other contruct variables, except sytem quality. This result show that system quality was not met good discriminant validity, but according to Hair, et.al [10] that if it's not necessary to exclude measurement variable because it's important based on content validity, the nature of construct may be altered. In this research because it's not necessary to exclude financial performnace construct, so we still use it for hypothesis testing.

F. Construct Reliability

Construct measurement is to determine whether the construct has a high reliability or not. Cronbach's coefficient alpha was used to access the scale reliability. Cronbach's alpha values greater than 0,700 state that constructs is reliable [9]. Cronbach's alpha value for each construct variable are presented in Table IV, opposite.

TABLE II. VARIABLE SCORE

Variable	Indicator/ Items	Estimate
Information Quality	IQ1	0.774
	IQ2	0.801
	IQ3	0.726
	IQ4	0.793
	IQ5	0.839
	IQ6	0.808
	IQ7	0.845
	IQ8	0.805
	IQ9	0.833
System Quality	SQ1	0.825
	SQ2	0.840
	SQ3	0.824
	SQ4	0.789
	SQ5	0.530
Perceived Usefulness	PU1	0.799
	PU2	0.829
	PU3	0.858
	PU4	0.858
	PU5	0.886
	PU6	0.860
User Satisfaction	US1	0.822
	US2	0.865
	US3	0.860
	US4	0.838

TABLE III. DISCRIMINANT VALIDITY

Constructs	IQ	SQ	PU	US
Information Quality	**0.813**			
System Quality	0.756	**0.779**		
Perceived Usefullness	0.693	0.802	**0.869**	
User Satisfaction	0.706	0.764	0.816	**0.875**

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TABLE IV. CONSTRUCT RELIABILITY

Variable	Cronbach's Alpha	Result
Information Quality	0.935	Reliable
System Quality	0.859	Reliable
Perceived Quality	0.934	Reliable
User Satisfaction	0.898	Reliable

G. Confirmatory Factor Analysis

The assessment of measurement model depended on reliability and validity estimates which were measured through convergent validity, discriminant validity, and construct reliability values [5]. Loading factor for each indicator was used to determine convergent validity. Square root of Average Variance Extracted (AVE) values was used to determine discriminant validity. While with the help of cronbach's alpha was adopted to gauge construct reliability. These measures are explained in this section.

H. Convergent Validity

Convergent validity evaluation is done using confirmatory factor analysis. The indicator is said to have a good convergent validity if it has a loading factor greater than 0.5 [9]. Figure 4 shows construct of each latent variable and loading factor for each variable.

The results show that not all values of the construct indicator loading have values above 0.5, indicators with loading values <0.5 need to be considered not to be included in the subsequent analysis because they are declared invalid. Then after the initial evaluation, invalid items were not included in the model, then re-evaluated and obtained the results and then the final measurement model were described on Figure 4.

Based on the results it is shown that all indicators on the variables in this study already have a loading factor value above 0.5 after evaluation which means that all variables in this study have valid indicators. Thus the next step of SEM can be processed.

Discriminant validity can be assessed through comparing the square root of Average Variance Extrcated (AVE) of construct variable with correlation with other constructs in the structural model. If square root of Average Variance Extrcated (AVE) of construct variable is greater than construct correlation with other constructs in the structural model, then good discriminant validity is achieved [9].

The result showed the values estimated through square root AVE and correlation among construct for measuring discriminant validity. All of contruct variables have square root AVE values more than their correlation with other contruct variables, except sytem quality. This result show that system quality was not met good discriminant validity, but according to [10] that if it's not necessary to exclude measurement variable because it's important based on content validity, the nature of construct may be altered. In this research because it's not necessary to exclude financial performnace construct, so we still use it for hypothesis testing.

I. Construct Reliability

Construct measurement is to determine whether the construct has a high reliability or not. Cronbach's coefficient alpha was adopted to access the scale reliability. Cronbach's alpha values greater than 0,700 state that constructs is reliable [9].

As per the results it can be seen that the cronbach's alpha values for each variable is greater than 0.700 so we can say that all construct variable in this study have good reliability.

J. CFA Result Summary

To sum up the reliability and validity measures, the tests conducted to analyze data confirmed that the measurement model of the present study is valid and can be further considered to assess the parameters of structural model.

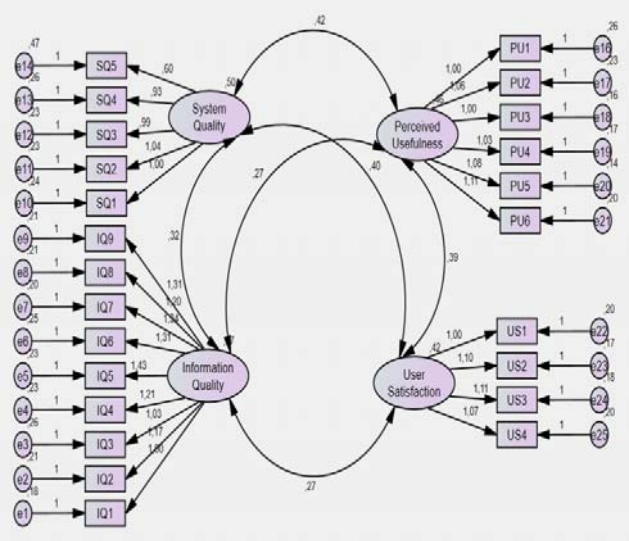

Figure 4. Loading Factor Model After Evaluation

Figure 4 provides the summary the values of each construct's items factor loadings, CR, and AVE values.

Summary of CFA result after evaluation show that all of measurement variables have good valdiity and reliability, so it can be used for hypothesis testing, in the next step of Structural Equation Modelling (SEM).

K. Goodness of Fit Model

Goodness of fit testing is done in SEM analysis to find out as the conceptual model is supported by empirical research results. There are 8 main criteria for testing the goodness of fit, which are explained together with the results of testing in this study.

TABLE V. GOODNESS OF FIT SCORE

Index	Cut-Off Value	Result	Goodness of Fit
Probability	≥ 0.05	0.000	Not Met
RMSEA	≤ 0.08	0.055	Met
GFI	≥ 0.90	0.861	Not Met
AGFI	≥ 0.90	0.830	Not Met
CMIND/DF	≤ 2.00	2.321	Not Met
TLI	≥ 0.95	0.942	Not Met
CFI	≥ 0.95	0.948	Not Met

Goodness of fit overall model shown in Table V above. If one of goodness of fit criteria meets the cut-off value then the model is considered feasible to use [9]. Goodness of Fit Model test results based on Table 5 shows that there is one criteria that have fulfilled the cut-off value, RMSEA in this model show value 0f 0.077 less than 0.08 so the SEM model in this study is suitable and can be used for hypothesis testing.

L. Structural Model and Hypothesis Testing

Evaluation of the structural model is done after the estimated model meets the criteria of convergent validity, discriminant validity, and construct reliability. Evaluating structural models is done to see the connection between latent constructs by knowing the estimated results of the path parameter coefficients and their level of significance. The structural model evaluation also reviews how much the model can explain the relationship between the exogenous variables and the endogenous variables studied.

Evaluation of structural models in this study was divided into 3 parts: 1) assessment of corrected determination coefficient (adjusted R2); 2) testing the path coefficient for direct effect in the structural model; and 3) testing the path coefficient for indirect effects in the structural model.

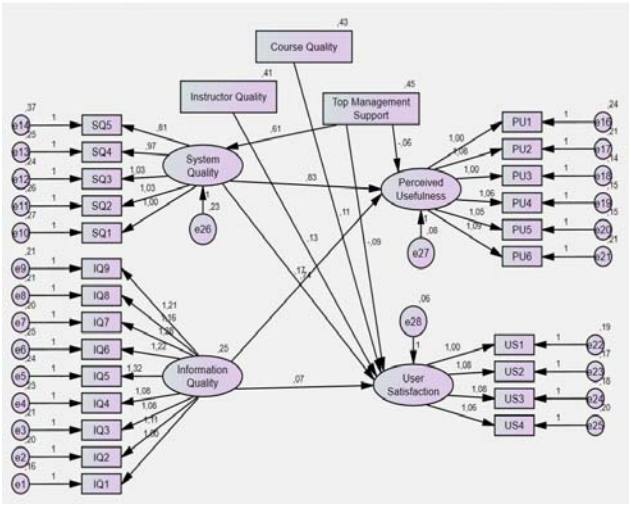

Figure 5. Structural Equational Model

M. Adjusted R2

The corrected determination coefficient (adjusted R-square) obtained from Top Management Support (TMS) on System Quality (SQ) is 0.416. The coefficient of determination of 0.416 states that System Quality (SQ) is able to be explained by the Top Management Support (TMS) variable of 41.6% and the remaining 58.4% is explained by other variables outside the study. While the corrected determination coefficient (adjusted R-square) obtained from System Quality (SQ), Information Quality (IQ), and Top Management Support (TMS) on Perceived Usefullness (PU) is 0.769. The coefficient of determination of 0.769 states that Perceived Usefullness (PU) is able to be explained by the System Quality (SQ), Information Quality (IQ), and Top Management Support (TMS) variable of 76.9% and the remaining 23.1% is explained by other variables outside the study. Corrected determination coefficient (adjusted R-square) obtained from System Quality (SQ), Information Quality (IQ), Course Quality (CQ), Instructor Quality (InsQ), and Top Management Support (TMS) on User Satisfaction (US) is 0.757. The coefficient of determination of 0.757 states that User Satisfaction (US) is able to be explained by the System Quality (SQ), Information Quality (IQ), Course Quality (CQ), Instructor Quality (InsQ), and Top Management Support (TMS) variable of 75.7% and the remaining 24.3% is explained by other variables outside the study. As per these findings, it can be said that structural model of this study has a strong predictive ability.

N. Direct Effects

Direct Effect testing in this study is done by checking the significance of the path coefficient of SEM, the path coefficient shows the magnitude of the effect of an independent variable on its dependent variable. Path coefficient values obtained from SEM are then used to test the effect on the hypothesis of this study. There are 9 direct effect that being tested in this study. Explanation of the effect of each variable on dependent variable is used to answer the research hypothesis. Hypothesis testing is done by seeing the p-value of each effect tested in this study. if the p-value is smaller than the level of significance in the study, then it is decided to accept the research hypothesis, and vice versa. The significance level used in this study is 0.05 (5%), this level of significance is commonly used for survey research [13]. Explanation of effect of each independent variable on dependent variable is explained in Figure 3 below.

The effect of top management support on system quality is significant at $\alpha = 0.05$, known by the p-value of 0.000, this value is smaller than 0.05 ($\alpha = 5\%$). A coefficient of 0.645 is positive and significant, means that more support that provided by top management on ERP project, ERP system qualfity that developed will be better, fewer support that provided by top management, ERP system quality that developed will be worse.

The effect of instructor quality on user satisfaction is significant at $\alpha = 0.05$, known by the p-value of 0.006, this value is smaller than 0.05 ($\alpha = 5\%$). A coefficient of 0.159 is positive and significant, means that if instructor have better both technical skills and pedagogical skills to facilitate courses offered via e-learning systems, user will be more satisfied, while if instructor have worse both technical skills and pedagogical skills to facilitate courses offered via e-learning systems, user will be less satisfied.

The effect of course quality on user satisfaction is significant at $\alpha = 0.05$, known by the p-value of 0.000, this value is smaller than 0.05 ($\alpha = 5\%$). A coefficient of 0.146 is positive and significant, means that better course quality that perceived by student, user will be more satisfied, while if worse course quality that perceived by student, user will be less satisfied.

The effect of system quality on user satisfaction is significant at $\alpha = 0.05$, known by the p-value of 0.000, this

value is smaller than 0.05 (α = 5%). A coefficient of 0.911 is positive and significant, means that better ERP system quality that perceived by student, user will be more satisfied, while if worse ERP system quality that perceived by student, user will be less satisfied.

The effect of information quality on user satisfaction is not significant at α = 0.05, known by the p-value of 0.095, this value is more than 0.05 (α = 5%). A coefficient of 0.071 is positive but not significant, means more or less information that provided by ERP system to student, doesn't affect user satisfaction.

The effect of top management support on user satisfaction is not significant at α = 0.05, known by the p-value of 0.041, this value is smaller than 0.05 (α = 5%). A coefficient of -0.133 is negative and not significant, more top management support will decrease user satisfaction, and vice versa.

The effect of top management support on perceived of usefulness is not significant at α = 0.05 known by the p-value of 0.217, the value is more than 0.05 (α = 5%). a coefficient of -0.065 is negative indicating the relationship of those variable is negative but not significant, meaning that if top management support better will not have an impact on perceived of usefulness, and vice versa.

The effect of system quality on perceived usefulness is significant at α = 0.05 known by the p-value of 0,000, the value is smaller than 0.05 (α = 5%). a coefficient of 0.904 is positive indicating the relationship of those variable is positive and significant, meaning that better the system quality, better the perceived of usefulness will be, and vice versa, if the system quality is bad the perceived of usefulness will also be bad.

The effect of information quality on perceived of usefulness is significant at α = 0.05 known by the p-value of 0,000, the value is smaller than 0.05 (α = 5%). a coefficient of 0.152 is positive indicating the relationship of those variable is positive and significant, meaning that better the information quality, better the perceived of usefulness will be, and vice versa, if the information quality is bad the perceived of usefulness will also be bad.

O. Indirect Effects

The indirect effect is known by looking at the coefficient of indirect effect obtained by multiplying the path coefficient of the direct effect of the independent variable with the mediating variable with the path coefficient of the direct effect of the mediating variable with the dependent variable. Testing is done by looking at the p-value on the sobel test for indirect effects.

The indirect effect between top management support on perceived usefulness through system quality, is obtained from the product of the direct effect between top management support on system quality and direct effect between system quality on perceived usefulness, therefore indirect effect is 0.596. Indirect effect hypothesis testing uses the sobel test. Sobel test result show that the p-value calculated using the sobel formula of 0,000 is smaller than the value of α = 0.05 (5%), so it is stated that there is a significant indirect effect between top management support on perceived usefulness through system quality.

The indirect effect between top management support on user satisfaction through system quality, is obtained from the product of the direct effect between top management support on system quality and the direct effect between system quality on user satisfaction, so that the indirect effect is 0.591. Indirect effect hypothesis testing use the sobel test. Sobel test result show that the p-value calculated using the sobel formula of 0,000 is smaller than the value of α = 0.05 (5%), so it is stated that there is a significant indirect effect between top management support on user satisfaction through system quality.

The indirect effect between top management support on perceived usefullness through system quality, is obtained from the product of the direct effect between top management support on system quality and the direct effect between system quality on perceived usefullness, so that the indirect effect is 0.596. Indirect effect hypothesis testing use the sobel test. Sobel test result show that the p-value calculated using the sobel formula of 0,000 is smaller than the value of α = 0.05 (5%), so it is stated that there is a significant indirect effect between top management support on perceived usefullness through system quality.

The indirect effect between top management support on user satisfaction through system quality, is obtained from the product of the direct effect between top management support on system quality and the direct effect between system quality on user satisfaction, so that the indirect effect is 0.591. Indirect effect hypothesis testing use the sobel test. Sobel test result show that the p-value calculated using the sobel formula of 0,000 is smaller than the value of α = 0.05 (5%), so it is stated that there is a significant indirect effect between top management support on user satisfaction through system quality.

P. Total Effect

From the direct and indirect effects, we summarized the total effects among all constructs.

As can be said that there were three antecedent factors: Top Management Support (TMS), Instructor Quality (insQ), Course Quality (CQ), System Quality (SQ) and Information Quality (IQ) that had effect on the three endogenous variables or dependent variables of System Quality (SQ), Perceived of Usefullness (PU) and User Satisfaction (US). Top Management Support (TMS) got the highest total effect from Sytem Quality (SQ) of 0.645. System Quality (SQ) got the highest effect from Perceived of Usefullness (PU) and User Satisfaction directly with path coefficient of 0.904 and 911.

V. CONCLUSION AND RECOMMENDATIONS

This paper is an attempt to introduce a customized ERP software for higher education institutions of Pakistan in specific and across the globe in general. The paper focuses on exploring the impact of Enterprise Resource Planning (ERP) in one of the well-known university of Pakistan. For that matter a survey is carried out across the relevant stakeholders of the university to explore the impact that the customized Campus Management System has.

The results of the survey were quite positive. This means positive correlations have been found among variables of this study. The research tried to explore the correlation among its independent variables (Top Management Support, Instructor Quality, and Course Quality) and dependent variables (System Quality, Information Quality, Perceived Usefulness, User Satisfaction.

The results of the survey showed that System Quality increases with the increased level of Top Management Support, and vice versa. Similarly, they also show that better the Instructor Quality, better the User Satisfaction will be, and vice versa. The results further reveal that good Course Quality will generate good level of User Satisfaction.

As per the results the better the System Quality is, the better the Perceived Usefulness will be. However, poor System Quality will account for poor Perceived Usefulness. While poor level of System Quality is associated with poor level of User Satisfaction. Information Quality also depicted positive correlation with Perceived Usefulness and User Satisfaction.

However, as per the results, Top Management Support will not have a significant impact on Perceived Usefulness, and vice versa. Last but not the least, the research revealed that Top Management Support will not help in generating better level of User Satisfaction, and vice versa. Analysis result in this study explain that ERP user (faculty staff and student) give positive response into ERP system development through instructor quality, course that they take to optimally operate ERP system, and support from top management on ERP system development. System as well information quality gets positive response too from ERP user. Good system and information quality provided by ERP system and supported by good instructor and quality, and presence of top management support stimulate user perceived of usefulness and user satisfaction, since almost all of independent variable in this research have significant effect on perceived of usefulness and user satisfaction.

This research found that top management support in this research has important role to increase ERP system quality and subsequently increase ERP user perceived of usefulness and satisfaction. Although top management support doesn't directly give an impact into user satisfaction and perceived of usefulness, but it indirectly affects user satisfaction and perceived of usefulness. Finally, thus study found that ERP development internal factor (system and information quality) and external development factor (course and instructor quality, and top management support) able to stimulate user satisfaction.

All in all, the significant positive correlations have been found among the variables, therefore, the extended Campus Management System have been having significant and positive impact on the university.

REFERENCES

[1] Abugabah, A., & Sanzogni, L. (2010). Enterprise Resource Planning (ERP) System in Higher Education: A literature Review and Implications. *International Journal of Computer and Systems Engineering*.

[2] Aldammas, A., & Al-Mudimigh, A. (2011). Ritical Success And Failure Factors Of Erp Implementations: Two Cases From Kingdom Of Saudi Arabia. *Journal of Theoretical & Appli-ed Information*.

[3] Alshaer, M. (2016). Utilizing ERP System in Higher Education: A Case of a HEI in the UAE. *Proceedings of The National Conference On Undergraduate Research (NCUR)*.

[4] Arvidsson, J., & Kojic, D. (2017). CSFs in ERP Implementation – The Perspective of the Procurement System User. *Jönköping International Business School*.

[5] Byrne, B. M. (2010). *Structural equation modeling with AMOS: Basic concepts, applications, and programming*. New York: Routledge.

[6] Davis. (1986). A technology acceptance model for empirically testing new end-user infor mation systems: theory and results. *Sloan School of Management, MIT*.

[7] DeLone, W., & McLean, E. (1992). Information systems success: The quest for the dependent variable. Information systems research. *Information systems research*, 60-95.

[8] Delone, W., & McLean, E. (2003). The DeLone and McLean model of information systems success: a ten-year update. *Journal of management information*, 9-30.

[9] Hair, J. F., Black. W. C., Babin. B. J., and Anderson. R. E. (2010), *Multivariate. Data Analysis, 7th ed*. Pearson Prentice Hall, New Jersey.

[10] Hair, J.F., Sarstedt, M., Hopkins, L. and G. Kuppelwieser, V. (2014), "Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research", *European Business Review*, Vol. 26 No. 2, pp. 106-121.

[11] Hoyle, R. H. (Ed.). (2012). Handbook of structural equation modeling. The Guilford Press.

[12] Kline, R. B. (2016). Methodology in the social sciences. Principles and practice of structural equation modeling (4th ed.). Guilford Press.

[13] Lavrakas, P.J. (2008). Encyclopedia of survey research methods. Sage Publications, Inc., Thousand Oaks.

[14] Maguire, S., Ojiako, U., & Said, A. (2010). ERP implementation in Omantel:a case study. *ndustrial Management & DataSystems*.

[15] Mtebe, J. S., & Raphael, C. (2018). Key factors in learners' satisfaction with the e-learning system at the University of Dar es Salaam, Tanzania . *Australasian Journal of Educational Technology*.

[16] Noamana, A. Y., & Ahmed, F. F. (2015). ERP Systems Functionalities in Higher Education . *International*

Conference on Communication, Management and Information Technology .

[17] Rabaa'i, A. A., Bandara, W., & Gable, G. G. (2009). ERP Systems in the Higher Education Sector: A Descriptive Case Study. *20th Australian Conference on Information System*.

[18] Seddon. (1997). A respecification and extension of the DeLone and McLean model of IS success. *Information systems research*, 240-253.

[19] Seddon, P., & Kiew, M. (1996). A partial test and development of DeLone and McLean's model of IS success. *Australasian Journal of Information*.

[20] Seo, G. (2013). Challenges in Implementing Enterprise Resource Planning (ERP) system in Large Organizations: Similarities and Differences Between Corporate and University Environment. *(Master's thesis, Massachusetts Institute Of Technology)* .

[21] Stair, R., & Reynolds, G. (2009). Principles of information Systems. *Cengage Learning* .

[22] Umble, Elisabeth, J., Haft, R. R., & Umble, M. M. (2003). Enterprise resource planning: Implementation procedures and critical success factors. *European journal of operational research*, 241-257.

[23] Walpole, R. E., & Myers, R. H. (1985). Probability and statistics for engineers and scientists. New York: Macmillan.