ANALYSING THE IMPACT OF ENTERPRISE RESOURCE PLANNING ON USER SATISFACTION IN HIGHER EDUCATION INSTITUTIONS

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Abstract

The continuous improvements in the information system technology have made ERP one the widely used software in the organizations today. Higher Education Institutions are not very different from other business organizations. Tremendous amount of data is constantly generated in educational institutes which needs to be efficiently organized. For the same reason ERP is now making its way in education institutes to manage all types of data and help students, teaching staff and non-teaching staff in their daily activities. However, the satisfaction level of ERP users in educational institutes was unclear and needed thorough study. The main thought off motto of this research is to quantitively analyse the major consequences of ERP implementation on the level of contentment of people concerned with Higher Educational Institutions. Various independent variables are identified and their relationship with user satisfaction is statistically analysed using multiple regression analysis on the primary data that is collected from ERP users with the help of structured questionnaires. It was found that User Interface and Responsiveness of the ERP software had critical role to play with user contentment and performance. Furthermore, Completeness, Timeliness and Usefulness of the information provided on the ERP platform have significant relationship with the User Satisfaction of Higher Education Institutions. These findings can be utilized by ERP vendors during ERP suite development and implementation process in a Higher Education Institution.

Keywords:
ERP, Higher Education Institution, User Satisfaction, Management Information System

1. INTRODUCTION

In this 21st century where everything is dynamic and continuously evolving, there is a noticeable difference between the ways people work now and just a couple of years back. There is a paradigm shift in technology in just few years and is responsible for the rising productivity in working environment. Organizations, whether small or large, are trying to increase the efficiency of their operations by working their way through the ocean of data which is generated every single day and to do so, they use Enterprise Resource Planning. An ERP system is a highly customizable software suite, used for information system management within and across functional areas of any organization [1]. It is capable of automating, streamlining, integrating, and managing vital processes of the organization together with maintaining a streamline flow of data across all functional domains by integration all the departments of the organization. ERP creates a central repository of data that can be accessed anytime, anywhere and by any stakeholder of the organization. Additionally, ERP has several benefits such as real time data collection, automation of routine processes, flexibility, optimizing processes and many more.

A higher education institution (HEI) is like a business organization. In HEI the teaching staff is the knowledge provider, and the scholars are the knowledge receivers like the producer and consumers of goods/services in a business [2]. Furthermore, the number of academic institutions is proliferating and with the increase in enrolments together with addition of new departments, existing institutions are overloaded with data. The sole purpose of a HEI is sharing of knowledge between teaching staffs, non-teaching staffs and students to increase the quality of education. To facilitate a seamless transfer of information and to manage enormous amount of data generated by various departments, a custom ERP solution is vital for HEI.

This research aims at examining impacts of ERP on satisfaction level of people in the institutions of higher education to enhance the grasp of various underlaying factors of ERP installation and execution in these institutions.

2. LITERATURE REVIEW

In the past few years, various authors have done phenomenal work and contributed significantly towards bringing ERP closer to the higher education institutions. If ERP is to be implemented in the HEI, it is important to note the fundamental differences between key requirements of an organization and an educational institute. Chaushi et al. [3] distinguished the ERP modules used by organizations and HEI and laid down their features separately. It was also found that it was not wise to directly apply the modules used in the industries into the HEI, as the functionalities in HEI are very different than that of an organization. Identifying the difference is vital to build a structure that can be studied and followed during the implementation. Sabau et al. [4] worked towards constructing an evaluation framework for Romanian universities. After conducting thorough analysis about the strength, weakness, opportunity, and threats of educational institutions of Romania, an ERP framework was designed and was implemented in the universities.

Further, the difference in performance between existing ERP and new system was analyses to see which fits well for the university. The study revealed that different ERP frameworks, although complex, deliver similar benefits and the focus should be on pricing and benefits for students by reducing complexity of the system. The functionalities of ERP were further explored by Noaman et al. [5] to understand the units that serve well in higher educational institute and future needs by conducting research in Saudi universities. It was found that the functionalities offered by organizational ERP were totally different than the needs of educational institutions. There is a need of custom ERP solution for HEI to address their academic structure and processes. When implementing ERP in educational institute, there are several factors that come into play which determine the success of ERP. These factors could be hidden or visible, direct, or indirect. To

study these factors Kalema et al. [6] collected, authenticated, ranked, and classified thirty-seven factors that influence ERP implementation in HEI. These factors were classified into critical, inert, active, and reactive and could be helpful for decision makers to make choices regarding implementation strategies should any factor dominates.

However, just knowing critical success factors will not help if the decision making is not effective regarding the implementation process. To bridge this gap, Luo et al. [7] gave a framework to help the decision makers better assess the customization possibilities to match the ERP with the organizational processes. With the help of a case study, total nine customizations were identified and could fulfil the requirements of a HEI according to feasibility, availability, and practicality. After ERP is implemented in the institute it is vital to know the efficiency of its working. The better the knowledge of its effective working, the wider the scope of better customizations in future ERP. Peters et al. [8] therefore worked towards developing an analytical framework to better judge the effectiveness of ERP in HEI. Their study incorporated the use of Balanced Scorecard (BSC) and ISO 25010 models which is used for performance assessment and determining the quality standard of a software product respectively. After extensive study, they proposed twenty-six assessment standard index and five dimensions to evaluate the effectiveness of ERP performance in HEI.

Despite all the theoretical and analytical studies, handful of work is conducted to statistically measure the performance of ERP in educational institutes. However, Abugabah et al. [9] used quantitative analysis to statistically evaluate the performance of people using ERP in HEI. The results of research concluded that quality of ERP package, technology and quality of information were the deciding factors that influence the performance of people using ERP in an educational institute. The results are very helpful for ERP vendors who design the packages for HEI as it helps them to better gauge the needs, characteristics, and level of competencies of users using these software packages.

When we talk about the usage of ERP in HEI institutions, it is vital to note that only focusing on operations and process efficiency is not sufficient. HEI is the place of knowledge generation and enabling ERP to manage that knowledge and work according to it, is the key objective of implementation in the first place. The study conducted by Li et al. [10] focused on the challenges faced by ERP in knowledge-based environment and highlights the role of knowledge integration and management in organization. Furthermore, Kumar and Gupta [2] conducted a study to analyse the strengths and weaknesses of educational institutes with respect to their knowledge management capabilities through ERP. The study further proposed a dedicated lecture module as a part of knowledge management to better utilize the knowledge of teaching staff for overall development of university.

All the previous works have contributed to the understanding of ERP implementation in HEI by highlighting many vital factors. However, there was a lack of quantitative study to understand the effect of variation of those factors over user satisfaction. Thus, impact of ERP implementation on the satisfaction level of users of educational institutes needed to be thoroughly investigated.

3. THEORETICAL FRAMEWORK

Several researchers have worked diligently towards building information system models that fit well into the requirements of organizations. Their investigations were focused on building models that satisfies the need and improves the user efficiency. As a result, many models were successfully constructed with the help of various associated factors. The current study derives its theoretical framework from the extensive literature survey of the previous information system models which is shown in Fig. 1.
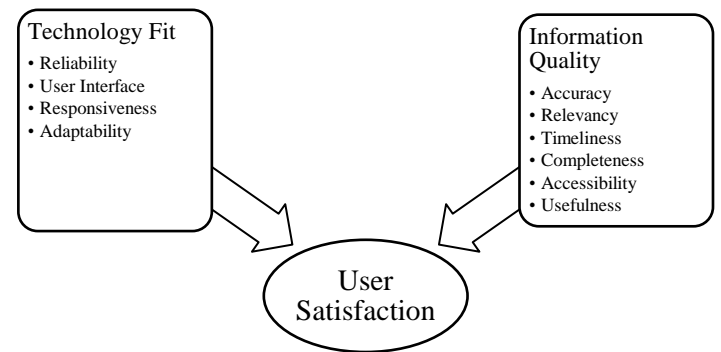

Fig.1. Theoretical model for the study

This study aims at analysing the influence of two factors individually on the satisfaction level of the users of ERP in HEI. The first factor is Technology Fit which contains Reliability, User Interface, Responsiveness and Adaptability that measures the trustworthiness, ease of locating content, performance, and ease of use of the ERP respectively. The Technology Fit Factor is vital to understand the technical aspects of the software and its efficiency [11]-[13].

The second factor is Information Quality which consist of Accuracy, Relevancy, Timeliness, Completeness, Accessibility and Usefulness [11] [14] [15]. The measures of the Information Quality are important to analyse the quality of information provided on the ERP portal of HEI. The User Satisfaction will be the function of these two factors which are inherent to an ERP system [12].

4. METHODOLOGY

To conduct this study, primary data was collected through the survey of 114 ERP users from higher education institutions of Eastern Uttar Pradesh. The questionnaires were made after thorough literature study and consists of close-ended, and Likert Scale based questions (5-point scale ranging from Strongly Disagree to Strongly Agree) that measures the independent variables in Technology Fit factor and Information Quality factor. Multiple Regression Analysis is conducted to statistically determine the significant impact of the independent variables in Technology Fit and Information Quality on User Satisfaction. According to the test results variables having significant relationship with User Satisfaction will be determined.

5. ANALYSIS AND INTERPRETATION

Out of 114 responses, 70% of the respondents were students and rest belong to teaching and non-teaching category. Since the

educational institutes predominantly consist of students, their majority was reflected in sample survey. Further, 19% of the respondents were teaching staff and 11% from non-teaching staff.
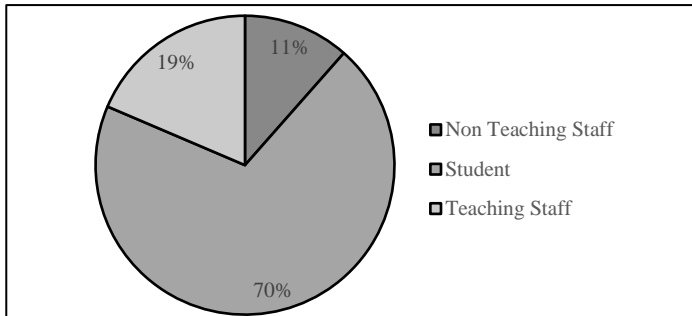

Fig.2. Proportion of people in the survey of HEI

Table.1 represents the value of Cronbach's Alpha which is 0.94 based on the computation of primary data. This value indicates that the measurement construct has a very high scale reliability and very good internal consistency of grouped items.

Table.1. Result of Reliability Test

Cronbach's Alpha	N
.940	11

5.1 THE IMPACT OF TECHNOLOGY FIT FACTOR

The results of the correlation test in Table.2 shows that user satisfaction has a strong and positive correlation with User Interface ($r=0.629$) and Responsiveness ($r=0.616$), which gives a clear picture that the improved design and performance of ERP will result in more contentment of the users.

Further, Reliability and Responsiveness also show a strong correlation ($r=0.683$). Additionally, the high degree of correlation between User Interface and Adaptability ($r=0.678$) shows that better design of ERP will lead to ease of learning and result in greater satisfaction of the user. Also, there is a very strong and positive correlation between Responsiveness and Adaptability ($r=0.696$).

Table.2. Result of Correlation Test for Technology Fit Factor

	User Satisfaction	Reliability	UI	Responsiveness	Adaptability
User Satisfaction	1.000	.483	.629	.616	.558
Reliability	.483	1.000	.624	.683	.637
UI	.629	.624	1.000	.615	.678
Responsiveness	.616	.683	.615	1.000	.696
Adaptability	.558	.637	.678	.696	1.000
Note: The values of correlation (r) are significant at 0.00 (1- tailed)					

Table.3. Regression[c] Analysis for Model 1

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.693[b]	.480	.470	.937
b. Predictors: (Constant), UI, Responsiveness				
c. Dependent Variable: User Satisfaction				

Table.4. ANOVA[a] Results for Model 1

	Model	Sum of Squares	DOF	Mean Square	F	P
1	Regression	88.965	2	44.483	50.7	.000[b]
	Residual	96.504	110	.877		
	Total	185.469	112			
a. Dependent Variable: User Satisfaction						
b. Predictors: (Constant), UI, Responsiveness						

Table.5. Coefficients[a] Summary for Model 1

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
1	(Constant)	.173	.315		.550	.584			
	UI	.454	.099	.402	4.603	.000	.629	.402	.317
	Responsiveness	.417	.099	.369	4.229	.000	.616	.374	.291
a. Dependent Variable: User Satisfaction									

Table.6. Correlation Test for Information Quality Factor

	User Satisfaction	Accuracy	Relevancy	Timeliness	Completeness	Accessibility	Usefulness
User Satisfaction	1.000	.650	.538	.706	.749	.606	.413
Accuracy	.650	1.000	.693	.746	.677	.668	.445
Relevancy	.538	.693	1.000	.621	.558	.658	.523
Timeliness	.706	.746	.621	1.000	.730	.643	.364
Completeness	.749	.677	.558	.730	1.000	.653	.347
Accessibility	.606	.668	.658	.643	.653	1.000	.375
Usefulness	.413	.445	.523	.364	.347	.375	1.000
Note: The values of correlation (r) are significant at 0.00 (1- tailed)							

Table.7. Regression[d] Analysis for Model 2

Model	R	R Square	Adjusted R Square	Std. Error
2	.794[c]	.631	.621	.793
c. Predictors: (Constant), Completeness, Timeliness, Usefulness				
d. Dependent Variable: User Satisfaction				

Table.8. ANOVA[a] Results for Model 2

Model		Sum of Squares	DOF	Mean Square	F	Sig.
2	Regression	116.971	3	38.990	62.04	.000[d]
	Residual	68.498	109	.628		
	Total	185.469	112			
a. Dependent Variable: User Satisfaction						
d. Predictors: (Constant), Completeness, Timeliness, Usefulness						

Table.9. Coefficients[a] Summary for Model 2

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
2	(Constant)	.182	.277		.657	.513			
	Completeness	.475	.086	.477	5.552	.000	.749	.470	.323
	Timeliness	.312	.087	.308	3.567	.001	.706	.323	.208
	Usefulness	.149	.069	.136	2.156	.033	.413	.202	.126
a. Dependent Variable: Satisfaction									

According to the model 1 summary in Table.3, User Satisfaction has a high and positive relation with User Interface and Responsiveness (R=0.693). Furthermore, 48% of the variation experienced in the User Satisfaction can be very well illustrated by the Responsiveness and User Interface of the ERP system.

As per the results of Table.4, the overall fitness of the model 1 is validated and defined with F value 50.704. This is considered statistically evidential because value of p, which as shown above being 0.000, lies below the significance mark. Therefore, the independent variables, namely user interface and responsiveness are statistically significant.

The summary of Table.5 clearly indicates that both the factors, namely User Interface and Responsiveness have a statistically

significant relationship with the User Satisfaction as their p-value is 0.000, which is below 0.05 significance limit. Hence, for a unit change in User Interface, the User Satisfaction will change by 0.402 units and for a unit change in Responsiveness the User Satisfaction will show an alteration by 0.369 units.

5.2 THE IMPACT OF INFORMATION QUALITY FACTOR

The results of Pearson correlation in Table.6 indicates that there is deep and pragmatic reciprocity of contentment level with Timeliness (r= 0.706) and also with Completeness (r= 0.749).

This helps to relate the fact that proper availability and integrity of information is vital for user performance and will ultimately result in user contentment. Further, Accuracy is

strongly related to Timeliness (r= 0.746) which further has a good and positive relation with Completeness (r= 0.730) of the information provided on ERP system.

After careful observation of the computation of the regression model 2 from Table.7, it is illustrated that User Satisfaction is positively related to the Completeness, Timeliness and Usefulness of the information provided on the ERP system as R is 0.794. Additionally, 63.1 % of the variation in the user satisfaction can be explained by these three variables of the information quality factor (as $R^2 = 0.631$).

The results of Table.8 validate the overall fitness of the model 2 with F value being 62.045 which indicates higher variation between sample mean. The independent variables Completeness, Timeliness and Usefulness are statistically significant as p-value (.000) lies below 0.05.

As per the results of Table.9, Completeness, Timeliness and Usefulness of the information have a statistically significant impact over User Satisfaction as their p-values are 0.00, 0.001 and 0.033 which is below the 0.05 significance mark. Additionally, for a unit change in Completeness, Timeliness and Usefulness, the User Satisfaction will change by 0.477 units, 0.308 units and 0.136 units respectively in the positive direction.

6. CONCLUSION

This study aimed at investigating the impact of various independent factors in ERP implementation over the user satisfaction level of Higher Education Institution and how these factors can influence their performance. From the results of the analysis, it is evident that in Technology Fit Factors, User Interface and Responsiveness of the software package has statistically significant relationship with the User Satisfaction. This implies that design and performance of the ERP software is vital for a good user experience from technology point of view. On the other hand, Completeness, Timeliness and Usefulness of the Information Quality factor, has statistically significant relationship with User Satisfaction. So, any variation in the wholeness, availability and usefulness of the content provided by the academic ERP will directly affect the satisfaction level of the users in HEI. All this information can be utilized by the ERP vendors when designing the custom modules for the ERP software package of Higher Education Institutions.

7. FUTURE SCOPE

Although, every parameter was considered for the construction of the research design after going through the previous works on the ERP for HEI, still there is always room for improvement. Future investigation can involve more independent variables and a detailed analysis of critical success factors and their impact on the users of higher educational institutions. A bigger sample size with more educational institutes can be incorporated to get a more detailed picture on the successful implementation of ERP in Higher Educational Institutes. Also, the future analysis can incorporate the study of all the factors combined, rather individually, in order to get a holistic view on the user satisfaction.

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