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Assessment of User Satisfaction on Usability of ERP Implementation:
A Case Study of The American University of Nigeria (AUN) Openerp System

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ABSTRACT

abstract
In recent years, various organizations, institutions of learning and companies have implemented the Enterprise Resource Planning (ERP) systems due to its ability to integrate various functions into one complete system that will streamline processes and information sharing through a centralized administration. Regardless of the various benefits of the ERP system, its adoption and implementation have not been without problems. Many of these institutions have assigned considerable resources to their ERP projects, but have encountered unexpected challenges. Neglecting a number of important factors in ERP projects might not lead to achieving the desired success. As a result, user satisfaction plays a huge role among other factors in influencing a successful ERP implementation. The driving force behind this research work is that of assessing the user satisfaction on usability of the ERP implementation system with the view to ascertaining user satisfaction in terms of its content, accuracy, format, ease of use and timeliness of the EUCS model to determine the satisfiability rate of OpenERP users of the system. It is widely acknowledged that enterprise resource planning (ERP) systems suffer from complex user interfaces. Consequently, the complexity of these user interfaces negatively affects the usability of these systems. It is therefore appropriate to review the measures of user satisfaction which majorly determines IS success. The study was conducted using a survey which was designed via google forms and sent to all students (end-users) with questions that validate each construct of the EUCS model designed by Doll and Torkzadeh. The data collected will be analyzed using Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) on each construct to determine and ascertain overall satisfaction.

Keywords – Assessment, User Satisfaction, Usability, Implementation, University, AUN, Openerp System.

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1. BACKGROUND OF THE STUDY

User satisfaction is generally regarded as one of the most important measures of Information Systems success. The level of satisfiability of any system in place should be ascertained to ensure its end-users get the required benefits for which the system was intended. Enterprise Resource Planning (ERP) Systems are quickly gaining grounds as their implementation is now prevalent in most organizations and institutions of learning due to its facilities or modules that provide central administration, coordination and communication amongst various departments.

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The ERP support both core processes of business and administrative tasks with the aim to provide better resource management and information flow. It also supports business functions, patient management systems in hospitals, large volume retailing, overall student management and administration in various institutions of learning etc. (Al-mashari, 2003). For most universities and other educational institutions, the ERP system provides an efficient integration that provides centralized administration for students, incorporates other human resource modules and fosters effective financial management and better overall system functionality (Zornada et al, 2005). Most companies also leverage on the ERP to increase the speed of decision-making, augment the overall costs of control and other operations while improving the distribution of information within the organization (Desdar and Ainin, 2011). ERP systems further accelerate the exchange and flow of timely and required information within the various units or parts of the institution or organization which enhances the overall strategic decisions prowess by management. Although several factors can be examined such as information quality, system performance, data quality, security etc. to determine the satisfiability rate of an ERP system. The work is aimed at examining user satisfaction on ERP system based on usability factor.

Enterprise Resource Planning (ERP)
Enterprise Resource Planning has garnered several accolades due to its numerous capabilities in terms of supporting and improving client satisfaction, better customer service, centralized administration and other effective quality measures (Tasevska et al, 2014). Davenport (2000) has also highlighted benefits of ERP that relates to reduction of inventory and increased productivity.
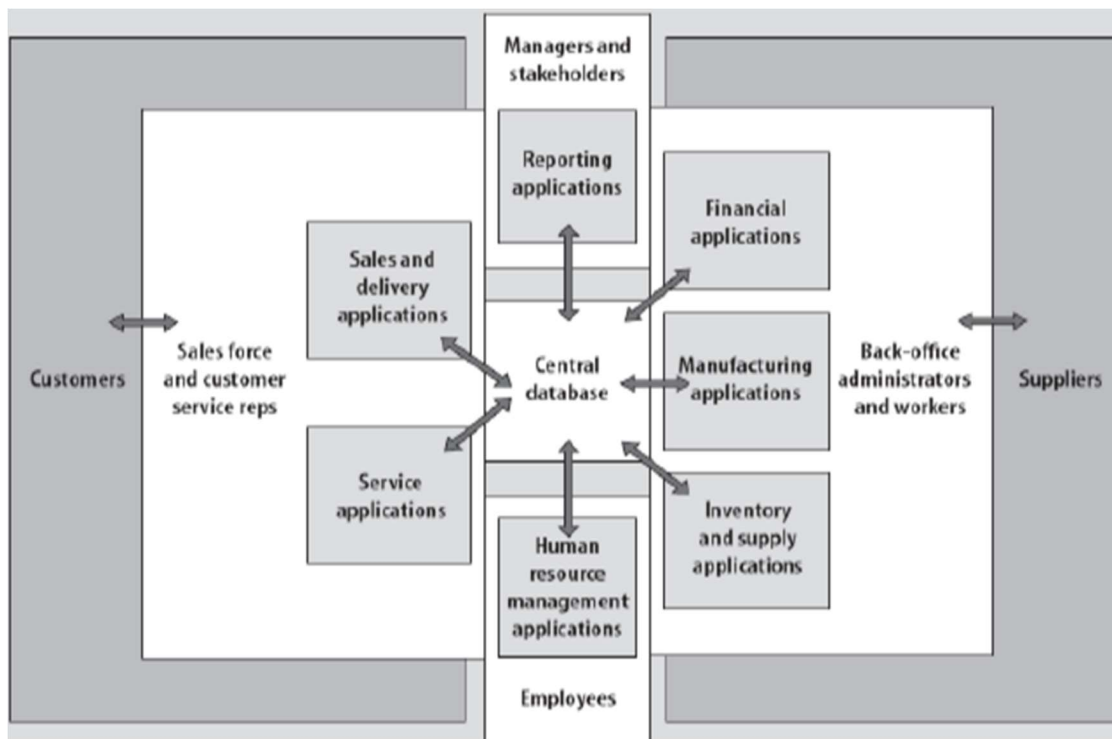

Fig 1: Davenport ERP

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It is widely used in industries, organizations and various institutions. As a result, various definitions that relates to ERP include a prepackaged software with a unique capability of integrating financial, organizational and institutional business processes with various encountered, foreseen or unforeseen operational problems to provide reliable, tested and functional answer across respective departments (Klaus et al, 2000). It capabilities that provide central administration, inventory processing, HR and strong communication between the various departments in the organization or institution cannot be ignored. Hence, different organizations and institutions of learning are leveraging on these capabilities that the ERP system provides in order to improve its overall performance.

1.1 Research Problem

The ERP system is opted for use by many companies, organizations and institutions of learning due to its centralized provisions for administration, communication and coordination. While in most cases ERP implementation has also recorded a fair number of successes, yet there is still reservation about the system's promised benefits (Al-Mashari and Zairi, 2000). Statistics has also shown that there is an increasing demand for enterprise systems with value of about $82.1 billion in 2015 (Statistia, 2017). On the other hand, 37 percent of renowned global organizations which have had considerable use of these ERP systems have considered their various experiences with the adoption of the IS system as not successful to what was earlier bargained for during the adoption or implementation phase (Sharma et al, 2016). On the other hand, Davenport (2000) who did extensive study on the ERP system describes its implementation as a very crucial and critical mission with diverse and uncertain challenges both technological and non-technological which organizations need to give attention to in order to ascertain the success of the user experience. The demand to assess this experience cannot be overemphasized as it will help in managerial decision making to understand areas of dissatisfaction and where communications and trainings need to be introduced. AUN has over the years employed the services of the ERP systems (which are quite expensive like SAP) leveraging on the OpenERP (free version) which many consider less secure.

"Usability evaluation is any analysis or empirical study of the usability of a prototype or system (Foltz et al., 2008). Several studies (Costa, 2010; Singh and Wesson, 2008) have proposed usability criteria which can be used for usability evaluations of ERP systems. However, all of these studies have taken place in industry and not in a higher education environment. The level of experience of an undergraduate student is not the same as a person in industry, therefore their perceptions of usability may differ. Existing studies of ERP adoption in the IS curricula are focused primarily on the pedagogical aspects and have not explored the usability or ease of use of the ERP system. Empirical research relating to the ease of use or usability of ERP systems is required particularly with regards to the evaluation of the ease of use of medium-sized ERP systems in educational environments (Singh and Wesson, 2008)". Hence, with such concerns there is need to assess user satisfaction with the various modules of the system. User satisfaction plays a huge role among other factors in influencing a successful ERP implementation.

Usability which is the first point of any information system experience by the end user has to ascertained before other technical aspects will be considered. Other parts of the ERP cannot be used when the end user is not satisfied with its usability.

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1.2 Research Objective

The aim of this study is to assess user satisfaction with the ERP implementation in terms of usability taking the opener system at the American University of Nigeria (AUN), Yola as a case study. The specific objectives of the research include

- To cross-examine the relationship of five factors (content, accuracy, format, ease of use, and timeliness) that impacts the satisfaction level among end users of the OpenERP system at AUN
- To examine critical factors in End-user Computing Satisfaction (EUCS) model (content, accuracy, format, ease of use, timeliness) that contributes the most to overall satisfaction.
- To investigate if users of this system find overall satisfaction with the system

1.3 Research Question

As user satisfaction role appears critical in ascertaining the implementation success of any information system, its success within the context of the American University of Nigeria cannot be ignored. Most present users were not available at the implementation phase of this system whereas others met the system in operation. The option to choose which system should be used may not have been asked, yet the need to carry effective research to get users feedback is crucial.

The question this research seeks to address is:
1. How satisfied in terms of usability are the users of AUN OpenERP system?

1.4 Scope of Study

Three categories of end-users are found operational with the OpenERP system at AUN. They include staff, faculty and students. Since we are looking at assessing satisfaction rate of users of the system, the research will cover the students predominantly as an entity since this is a fundamental work before a holistic research that will assess all the modules will be investigated upon.

2. RELATED LITERATURE

2.1 User Satisfaction in ERP implementation

The deployment of ERP systems has increased in the past years because of several benefits that it provides (Davenport, 2000). It is critical to note that the success of any information system is the user satisfaction derived from whatever the system has to offer. The general concept of user satisfaction has been a fundamental research topic due to the all-important role it plays in managing customer relationship (Wang & Song, 2017). User Information Satisfaction (UIS) was earlier developed to handle data processing to allow for satisfaction and effectiveness.

2.2 ERP Implementation Successes

In as much as the area of testing for ERP implementation success is still on the rise due to its complexity to ensure end-users satisfaction, successes has also been recorded in areas where some of these research were carried out. For example, (Delone & McLean, 2016) coined four factors that determine IS success implementation. The individual and organizational impact measures present success whereas the information quality and system quality measured the IS success on a long term. It was described as the extent to IS helps to reach the success of individuals, organizations and industries. Statista's researches show that ERP Software market has an increasing value, it was obtained to be 82.1 billion $ in 2015 with (SAP) having the largest market share (Statistia, 2017). It also shows rising revenue for global Enterprise applications.

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The increasing value of the ERP software market indicates an increasing demand for Enterprise systems. Beyond than that ERP systems reshaped business environment and helped to transform the competition into higher levels; ERP systems are also becoming necessities to meet the needs of the growing market in such a dynamic environment to help creating and sustaining a competitive advantage (Yassien et al., 2016). Some authors such as Tasevska et al. (2014) outlined a positive impact for ERP systems on organizational success in terms of client satisfaction, customer service and quality measures. Other benefits that relates to reduction of inventory, increased productivity are introduced by Davenport (2000), Shen et al. (2016), Markus et al. (2000), Wittstruck & Teuteberg (2012) . More effective business and supply chain management processes, improved communications, better integration between different functions are other benefits recorded by (Al Mashari et al, 2003). Also, Shen et al (2016) recorded an increased profit and better performance level caused by ERP system usage.

2.3 Challenges of ERP Implementation

Many a people attribute the challenges faced with the ERP system due to its complexity that handles large processing, communication and information handling. It is very important, that implementation is done in stages. "Trying to implement everything at once will lead to a lot of confusion and chaos. There is also the need for appropriate training and the implementation to determine user satisfaction" (Howarth, 2007). The users of the system should be comfortable in using the IS application else it will backfire with redundant work and functional inefficiencies (Hartson, 2001). There is also the lack of proper analysis of requirements that will eventually lead to non-availability of certain essential functionalities. This might affect the operations in the long run and reduce the productivity and profitability. The lack of support or approval from senior management may in most cases also lead to unnecessary frustrations in work place. Also, it will cause delay in operations and ineffective decisions.

So, it is essential to ensure that the Senior Management supports the transformation. Another very important part relates to the compatibility issues with ERP modules that impede effective integration of modules. Companies associate different vendors to implement different ERP modules, based on their competency . It is very essential that there is a way to handle compatibility issues. The investment in their infrastructure is very essential although expensive as there will be the need for good processing speed and adequate storage. The AUN operates on the free version which many feel although it is free its challenges are much and have to be curtailed through proper implementation and continuous assessment to ascertain user satisfaction on the IS infrastructure on ground otherwise the enterprise version is encouraged although expensive.

2.4 Related Research on ERP Usability

Although research on ERP usability has been around and evolving for quite a while, the issue is still critical and clearly ERP usability is still a challenge with enterprises worldwide. With an estimated market of $38 billion, the widespread adoption of ERP systems has received well-deserved attention from the research community on this topic for decades now (O'farrell, 2011). "Companies worldwide continue to seek to maximize their ERP software investment while increasingly relying upon these systems to meet basic information management needs" (O'farrell, 2011). These needs relate to focusing efforts on increasing the degree of integration across data sources, and enhancing business decision-making by moving ERP implementations to more flexible architectures. However, while ongoing implementations of ERP systems are increasing, usability of these systems is not following the same growth rate and in fact, is flat-lining (O'farrell, 2011).

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Delone and McLean (1992) in their book the model of Information system success highlighted that ways should be determined to incorporate service concepts with desirable traits into the system that will lead to increase user satisfaction. Hence, the need for organizations and institutions to maximally seek to ascertain satisfaction level from its users. Several principles of ERP usability ranging from attitude-behavior theory, theory of reasoned action and the technology acceptance model have been employed to assess and increase usability. Al-jabri (2014) in his research on the Antecedents of user satisfaction with ERP systems used a mediation analyses to investigate the impact of four important influencing factors on user satisfaction with an in-house developed ERP module in a large oil and gas company in Saudi Arabia. He explored to find if communication campaigns, training, benefits and ease of use are antecedents of user satisfaction while examining the mediating effects of ease of use (EoU) and benefits of satisfaction.

A total of 104 ERP users who were actively involved in its implementation process served as the respondents. At the end of the study he found out that both EoU and benefits fully mediate the relationship between training and satisfaction. This is also in line with the research model that will be looking at a positive effect of EoU on user satisfaction. Nielsen (1991) also proposed on the heuristic approach which provided about ten (10) guidelines that guides the assessment of user satisfaction with usability. The heuristic approach enables a person to discover or learn something for themselves or in the course of using an IS infrastructure. These approach has gotten several accolades as it has been referenced in more than 293 research works. Hence, the efficacy of this approach will be used in the course of this research alongside the EUCS model to enable the user to send in inputs of concerns or challenges with the system during the course of work. The combination of the two models for evaluating and assessing user satisfaction will make this work a strong piece that will assess user satisfaction based on some criteria on the EUCS and the scrutinize feedbacks received from the users via the heuristic approach .

3. METHODOLOGY

The research carried out here is both descriptive and explanatory purposes as it will be used to assess the usability satisfaction of end-users of the AUN OpenERP system, particular students. A quantitative approach is employed in this research and a survey strategy will be used to collect information about satisfaction criteria from the respondents using a questionnaire to serve as our primary source of data. This approach was chosen based on the fact that there is need to understand and make statistical inference from the data obtained for well informed decision making on the variables that will determine the state.

3.1 Theoretical Background
The theory used in this research is the EUCS Model which was propounded by Doll and Torkzadeh in 1988 used to assess end user satisfaction of computing systems. From the various underlying literature that we've seen on ERP Systems, user satisfaction and usability satisfaction criteria that have been used overtime by organization, companies and other institution of learning. The EUCS MODEL will be used in this research to assess the end-user satisfaction of students. Since this is a fundamental work on assessment of usability on the AUN OpenERP system, there is need to test its satisfaction and valididty with this model since its assessing very key issues that relates to user satisfaction on usability. Doll and Torkzadeh's (1988) EUCS model is based on five independent constructs which are used to estimate the dependent variable (satisfaction). These constructs are: (a) content, (b) accuracy, (c)format, (d) ease of use, and (e) timeliness. Since then, the model has been empirically tested and end-user's satisfaction is accepted as a reliable determinant of information system success.

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The model has been extensively tested by many researchers and the instrument validity (content validity, construct validity, and reliability) as well as internal validity, external validity, test retest reliability and statistical validity have been demonstrated (Ives et al, 1983). A quantitative approach will be used in this research leaning on the critical realist philosophical underpinning. The EUCS has five (5) instrument has five (5) constructs (content, accuracy, format, ease of use, timeliness) which Users of the OpenERP system will be issued a survey questionnaire containing questions from each of the measuring variables. Based on the outcome from the respondents, an analysis will be carried out to test for the correlation coefficients and regression to ascertain the effect of the dependent variables on the independent variable, usability.
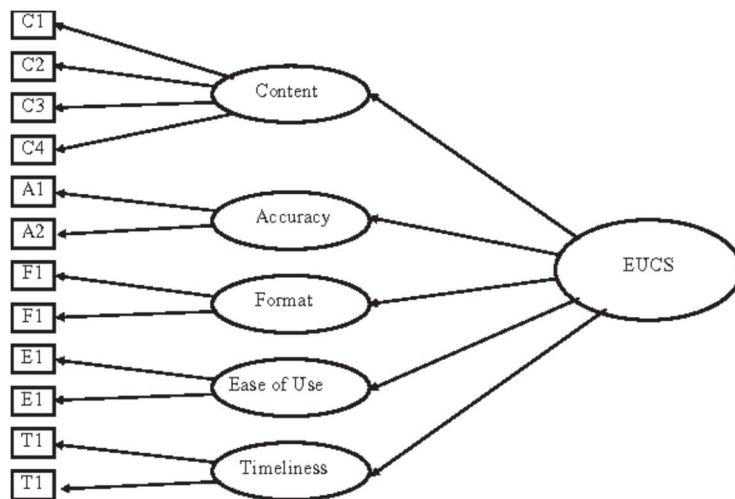
Fig 2: The EUCS Model

3.2 Research Hypothesis
For this research study, the End-User computing and Satisfaction Model will be used to carry out the assessment of user satisfaction with usability in AUN OpenERP implementation. It will serve as our hypothetical tool for this research:

The End User Satisfaction model which highlights the role of various variables in determining end-user overall satisfaction on usability in terms of content, accuracy, format, ease of use and timeliness.

Content: Comprehensiveness of the information provided. In this construct, the satisfaction of the user will be analyzed based on the its ability to provide precise information. It will also ascertain if the information content meets end-user needs. It will also seek to find if the system provides reports that seem to be just about exactly what you need and the sufficiently of the information provided. Under this construct, our Hypothesis, H1:

H1: The content offers a positive overall satisfaction rate for users

Accuracy: The correctness of the output information. The accuracy construct will seek to find if the AUN OpenERP system is accurate and if the users are satisfied with the provisions of its accuracy.

H2: The accuracy offers a positive significant effect on user satisfaction

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Format: The material design of layout and display of output contents. The format construct will seek to assess end-user satisfaction based on whether the format of the AUN OpenERP system is formatted in a useful manner and whether the information is clear enough for effective use.

H3: The format offers a positive significant rate of satisfaction for users

Ease Of Use: The ease or difficulty with which the user may act to utilize the capability of the system. The ease of use construct of the EUCS model will seek to assess the end-user's satisfaction based on whether the AUN OpenERP system is user friendly and if it's platform is so easily designed as to enable a new user interact with it.

H4: The ease of use offers a positive overall satisfaction for users

Timeliness: The availability of the output information at a time suitable for its use. The time construct of the EUCS model will be used to determine if the users of this system are satisfied with its timely provisions of information and whether up-to-date information is provided. The response time of any IS system is of critical to its effective service delivery and needs to be ascertained.

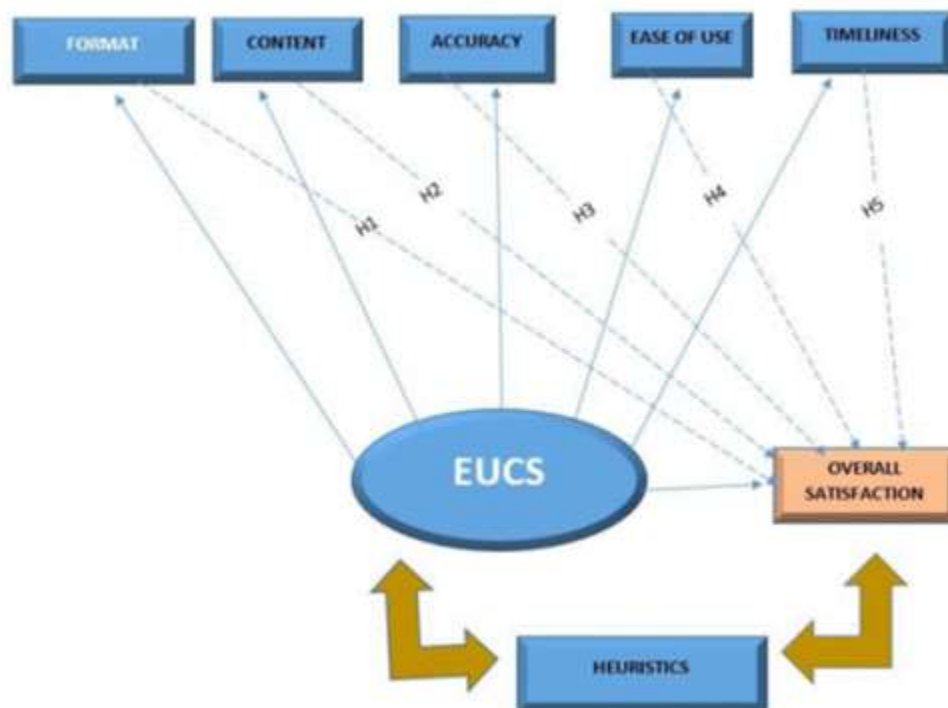H5: if there is satisfaction on timeliness it should have a positive effect on overall satisfaction

Fig 3: Proposed Research Model

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3.3 Population of the Study

Since the research is aimed at assessing the end-user satisfaction of the OpenERP implementation in AUN. The end-users in this case comprise of staff, faculty and students. The scope of the work was narrowed down to focus mainly on students. The number of students as obtained from University and records (Registrar) stood at nine hundred and sixty-six (966). This number will serve as the basis to ascertain end-user satisfaction of our respondents.

3.4 Population and Sampling

A population is basically every entity of interest to the work being researched on while a sample is a true subset representation of the population. The results and findings obtained can be generalized to the population since not everyone in the population can be reached. (Marczyk & Dematteo, 2005). Glenn (1992) highlighted that using academically accepted tables that provide sample size for various criteria can be employed to know the size to be used. Using these widely population tables will allow the researcher determine his sample size. Based on our population size of 906, we have obtained a sample size of 270 using the standardized published table (Bartlett, Kotrlik & Higgins, 2001) margin of error of 0.5, coonfidence level (t) of 1.96, and the estimated attribution (p) of 0.5; as seen below:

| Population size | Sample size | | | | | |
| | Continuous data (margin of error= .03) | | | Categorical data (margin of error= .05) | | |
	alpha= .10 t= 1.65	alpha= .05 t= 1.96	alpha= .01 t= 2.58	p= .50 t= 1.65	p= .50 t= 1.96	p= .50 t= 2.58
100	46	55	68	74	80	87
200	59	75	102	116	132	154
300	65	85	123	143	169	207
400	69	92	137	162	196	250
500	72	96	147	176	218	286
600	73	100	155	187	235	316
700	75	102	161	196	249	341
800	76	104	166	203	260	363
900	76	105	170	209	270	382
1,000	77	106	173	213	278	399
1,500	79	110	183	230	306	461
2,000	83	112	189	239	323	499
4,000	83	119	198	254	351	570
6,000	83	119	209	259	362	598
8,000	83	119	209	262	367	613
10,000	83	119	209	264	370	623

NOTE: The margins of error used in the table were .03 for continuous data and .05 for categorical data. Researchers may use this table if the margin of error shown is appropriate for their study; however, the appropriate sample size must be calculated if these error rates are not appropriate. Table developed by Bartlett, Kotrlik, & Higgins.

Fig 4: Population Size Table

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3.5 Method of Data Collection

There are two types of data when it comes to data collection namely primary and secondary. Primary data is one that is would be collected from various respondents whereas the secondary data are sets of data that are already found in literature and which can provide basis for the research area in study. (Randolph, 2009).
The method of data collection in this research involved the use of a questionnaire that was issued to the respondents. The questionnaire had various sets of questions for each construct of the EUCS model.

3.5 Research Instrument

The research instrument used was a questionnaire which contained 21 questions on likert scale of 1-5, where 5 represents strongly agree and 1 strongly disagree respectively. Four (4) demographics questions that require gender, age group, school and classification was included to help in descriptive analysis. The other five (5) sets of questions are short answers that employs a heuristic approach where end-users can specify exactly the challenge faced with any construct of the EUCS model while operating the OpenERP system. This will add to individual questions that can be added to the respective constructs.

3.6 Validity and Reliability of Research Instrument

The questionnaire was structured based on the EUCS Model following its construct characteristics that include content, accuracy, format, ease of use and timeliness. (Doll & Torkzadeh, 1988). My supervisor also validated the questions asked and style used in relation to the constructs which followed the model for the research.

3.7 Ethical Considerations

Ethical considerations were employed in the course of the research as no personal data was asked from our respondents. Every individual respondent also participated without being compelled.

3.8 Analysis Methods

Data analysis for this research study was carried out using Statistical Package for Social Sciences (SPSS) software. The analysis of data is carried out to discover answers to asked questions and to connect information from a quantity of data that was obtained. (Gliem, 2006). The various attributes of descriptive statistics like frequency and percentage was also used to test the level of significance at 5% level of probability. Descriptive statistics are used to generalize or describe variables and information from a given sample (Gliem, 2006). In this study, descriptive statistics are used to give a summary of the collected data with the questionnaire. Consequently, we obtained descriptive statistics using frequency for gender, school (department) and classification (University level). In order to measure the relationship amongst the different variables, a Pearson correlation test was done after the descriptive statistics test. Pearson correlation test is done when assessing the strength of the connection amongst numerical variables (Saunders et al., 2009). This test is conducted in this study to test the strength of the connection amongst the different variables. In this study, exploratory factor analysis (EFA) in SPSS is used to see how the various questions are associated or the interrelationship between the variables of the constructs. Confirmatory Factor Analysis (CFA) was also conducted to enable the hypothesis of the study to be tested.

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4. DATA PRESENTATION AND RESULTS

4.1 Demographic Characteristics of Respondents
Descriptive statistics is the summary the figures in a group of data which include numbers, graphs, percentages and tables. (Agresti & Finlay, 2009). The data obtained was mainly from a category of the end users which in this study focused on students.

4.2 Analysis
The data analysis was done using statistical package for social sciences (SPSS). The exploratory factor analysis (EFA) and confirmatory factor analysis were used to discover the structure of the construct with reliability and also to confirm the fit of the hypothesized factor structure observed respectively (Howarth, 2007)

Table 1. Showing the frequency of gender – male (1) & female (2)
Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	106	59.9	60.6	60.6
	2	69	39.0	39.4	100.0
	Total	175	98.9	100.0	
Missing	System	2	1.1		
Total		177	100.0		

Table 2: Frequency distribution for school (faculty)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	80	45.2	45.7	45.7
	2	55	31.1	31.4	77.1
	3	25	14.1	14.3	91.4
	4	15	8.5	8.6	100.0
	Total	175	98.9	100.0	
Missing	System	2	1.1		
Total		177	100.0		

Table 3: Frequency distribution for classification (level)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	67	37.9	38.3	38.3
	2	53	29.9	30.3	68.6
	3	33	18.6	18.9	87.4
	4	22	12.4	12.6	100.0
	Total	175	98.9	100.0	
Missing	System	2	1.1		
Total		177	100.0		

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4.3 Results
The results here will all be tested to satisfy convergent, construct and discriminant validity.

Table 4: Kaiser-Meyer-Olkin (KMO) and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.574
	Approx. Chi-Square	227.564
Bartlett's Test of Sphericity	df	105
	Sig.	.000

Table 5: Construct Communalities

	Initial	Extraction
C1	.285	.471
C2	.224	.220
C3	.238	.706
C4	.281	.999
A1	.227	.424
A2	.175	.230
F1	.130	.121
F2	.221	.999
E1	.127	.143
E2	.269	.536
T1	.215	.301
T2	.261	.265
OS1	.165	.418
OS2	.146	.165
OS3	.105	.121

Extraction Method: Maximum Likelihood.

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4.4 Common Variance

Analyzing the covariance will enable us to accept or refute standards that relates constructs to the overall satisfaction. Whether the variation is minimal or not.

Table 6: Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	2.734	18.225	18.225	1.785	11.899	11.899	1.619
2	1.468	9.788	28.013	.884	5.890	17.789	1.399
3	1.396	9.309	37.322	1.212	8.078	25.867	1.511
4	1.286	8.576	45.898	1.036	6.907	32.774	1.515
5	1.164	7.759	53.657	.658	4.386	37.160	.934
6	1.010	6.734	60.391	.544	3.625	40.785	.825
7	.934	6.229	66.620				
8	.857	5.710	72.331				
9	.792	5.279	77.610				
10	.698	4.651	82.261				
11	.655	4.368	86.629				
12	.598	3.988	90.616				
13	.511	3.407	94.023				
14	.473	3.156	97.179				
15	.423	2.821	100.000				

Extraction Method: Maximum Likelihood.
a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Table 7: Goodness-of-fit Test

Chi-Square	df	Sig.
29.633	30	.485

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Table 8: Structure Matrix

	Factor					
	1	2	3	4	5	6
C1	.673					
C2	.455					
C3	.376					.769
C4	.462			.983		
A1			.546			
A2	.387		.414			
F1		.329				
F2		.997				
E1					.332	
E2			.628	.324	.477	
T1	.371		.343		.357	
T2	.356		.377	.318		
OS1					-.586	
OS2			-.338			
OS3						

Extraction Method: Maximum Likelihood.
Rotation Method: Promax with Kaiser Normalization.

4.5 Hypothesis Testing

Here, our hypothesis or assumptions will be tested in relation to the EUCS constructs (content, accuracy, format, ease of use and timeliness).

- The **Confirmatory Factor Analysis** (CFA) is an SPSS tool that enables us to either 'Confirm' or 'reject' our preconceived theory or hypothesis. We have the following output from the CFA:
- C1 - C4 > 0.3 showing a positive impact of content on overall satisfaction
- A1 – A2 > 0.5 showing a positive impact on overall satisfaction
- F1 – F2 < 0.5 showing a negative impact on overall satisfaction
- E1 – E2 > 0.5 showing a positive impact on overall satisfaction
- T1-T2 > 0.5 showing a negative impact on overall satisfaction

Thus, testing our hypothesis via the exploratory factor analysis (EFA) confirms three hypotheses with positive impact on overall satisfaction of the IS OpenERP system.

5. DISCUSSION AND CONCLUSION

5.1 Discussion

The research on the assessment of user satisfaction with usability in OpenERP implementation at AUN showed the efficacy of the EUCS model in testing for overall user satisfaction. The heuristic approach that was employed also allowed for the respondents to send in their concerns with the OpenERP system based on any construct's feature or capability that needs to be improved upon. The heuristic approach (Nielsen & Molich, 1990) as a usability inspection method examines the system interface and judges it compliance with some usability principles (heuristics) in ascertaining user satisfaction.

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5.2 Limitation

The study had various limitations, in the sense that the EUCS as valid as it is does not have comprehensive construct's questions that addresses every issue as it relates to usability. Hence, the need for an heuristic approach was employed to allow users to send their challenges in line with each construct that will allow for more questions to be addressed in usability of the ERP system. Other limitations were from the population sampling as the expected number of sample size could not be met which in one way or the other affected the final outcome. Another limitation was the fact that the AUN OpenERP end-users comprised of staff, faculty and students. Whereas this research only focused on students to ascertain their satisfaction rate. Hence, the need to carry out a more holistic approach that will enable the management make well informed decision.

5.3 Suggestion for Further Research

Further work can be carried out that will cover the entire end-users of the system (staff, faculty and students) looking at areas of satisfaction from the human resource, communications, inventory etc. Once a holistic research of such is carried out, its outcome will go a long way in helping the management to make a well generalized informed decision about the IS system in use.

5.4 Conclusion

In conclusion all hypotheses were tested to determine overall satisfaction with the EUCS model. Each of the constructs played a role in ascertaining user satisfaction in terms of usability. The heuristic approach also made it possible for end-users' challenges or concerns in operating the OpenERP system to be addressed effectively as the proposed model (which combines EUCS and Heuristics) takes into consideration end user concerns and adds to the respective construct of the model to address a wider range of questions. This research as a fundamental piece for assessing user satisfaction has added to the field of IS with regards to ascertaining satisfiability of IS systems. With regards to our case study, the assessment has yielded positive impact on overall satisfaction for the content, accuracy and ease of use respectively from the EUCS model. On the other hand, EUCS constructs for format and timeliness showed negative on overall satisfaction as opposed to our earlier hypothesized theory.

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