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Testing of an ERP End User Acceptance Model for Teaching Faculties in a University

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Abstract

The acronym ERP is a buzzword in every sector. The undertaken article is the usage of ERP software in a university environment. There has been very few research conducted on the end user usage of ERP in a university environment. Looking at the growing research in education sector, this study aimed to test an ERP End User acceptance model in a university context. A structured questionnaire comprising variables of technology adoption was used to collect data from academic staff of 18 departments of the studied university. Correlation analysis and structural equation modelling of a total of 218 responses (after outlier elimination) was conducted using SPSS 22.0 and AMOS 26.0. It was found out that all the variables chosen for study (viz. perceived ease of use, perceived usefulness, computer self-efficacy, top management support, technical support, training and education, behavioural intension) have a positive impact on usage of ERP system. The facilitator factors (chosen from UTAUT model) viz. top management support, technical support and training and education which are considered as good predictors to measure usage in university environment, have shown good values after model testing with SEM. It was also found that behavioural intension was a significant mediator between the predictor variables and usage. The conceptual model developed in this study is a hybrid model taken from two tested, commonly used technology adoption models in IS (viz. TAM and UTAUT). Previously no research has been conducted using the conglomeration of two models and on end user usage behaviour of faculties of a technical educational institute. Thus, looking to the scope of the study, this study contributes to newness in education sector research.

Keywords— Enterprise resource planning, technology development, technology acceptance models, TAM, UTAUT, technical educational institute, ERP adaptation in technical institutes.

Introduction

ERP is an acronym which stands for Enterprise Resource Planning (ERP). The term was coined in the year 1990 by The Gartner Group who described it as new generation MRP II software. Tracing back to the evolution, this software evolved from Material Requirement Planning (MRP) and Manufacturing Requirement Planning (MRPII) in 1970 and 1980 respectively. Enterprise Resource Planning (ERP) has recently put its foot in the education sector. With the descent of information system (IS) and digitization, education too has taken a giant leap which has gradually captured global attention. Future scenario shows that there are many players ready to invest in education as well as training institutions with an aim of rapidly scaling up this sector. According to **Karande, Jain, and Ghatule (2012)** higher education is at an emerging stage and will have potential growth in the years to come. Educational enterprise resource planning (ERP) will become the most comprehensive administration automation suite for all kinds of educational institutions such as schools, colleges, institutions or universities. Institutes today spend significant amount of time preparing for regulatory reports. Institutes can definitely look up to an ERP system for generating accurate reports. Talking about technical educational institutes, **Thakur (2016)** considered technical educational institutes (TEI) as finishing schools for young talents, which needs to be more transparent and

effective. The ERP systems have given TEI a disciplined way and a better visibility to work. However, ERP software cannot operate alone on IS. The people factor has to go hand-in-hand to make it operate successfully. The main motive behind successfully running the software is a human-centric information system. This has made the complex IT to dwidle around human activity supported by computer and communication. With the digitization effect technical educational institutes are also into a neck-to-neck competition with other institutes, as how to give fineness to education and how to prepare the students for the global challenges. Embracing of technology is the only good option to be abreast of this competition. We have seen that with the onset of Covid-19 pandemic in 2020, there has been several challenges in educational front. Challenges like how to conduct daily classes was faced by institutions. But with the boon of technology during this challenging circumstance, institutions and educators managed to provide education with the help of online sessions through various platforms. Thus, during this severe crisis, when there was a question of how education will continue or proceed, technology was the only option which saved several students and institutes from falling back**. (Shams et.al, 2022)**

The technical institutes are at the initial stage of implementing ERP into their work environment. But there is sometimes seen failure in the implementation of the software. The reason behind is that some of the core modules of ERP don't fit the modules designed for education sector.**(Bologa, Bologa, & Sabau, 2009); (Esteves & Pastor, 2005); (Abugabah & Sanzogni, 2010**). ERP implementation in technical educational institutes (TEIs) are in burgeoning stage which makes this field fascinating for the researchers. With this backdrop, this study aims at developing and testing an ERP acceptance model in one of the technical institutes which has received Institute of Eminence (IOE) status in the country. The benefits derived from any ERP implementation should be assessed from 3 levels viz. researcher, university, broader business community **(Shivani Goel,2012).**

OBJECTIVE OF THE STUDY

The main objective of this study is as follows:

1. To develop and validate ERP usage model and explain end user (here taken faculty) usage of ERP in TEI (Technical Educational Institute) based on various technology adoption models.
2. To do a cross-sectional survey across different demographic segments and study the ERP usage of the faculties of the studied university.
3. Provide suggestions which can help to improve usage among faculty members in the university.

REVIEW OF LITERATURE

After extant review of literatures on most commonly used ERP success models, a self-constructed model was made prioritizing on TAM and UTAUT. When we look into any technology acceptance research, we see that UTAUT, and TAM have always been an effective model determining usage**. (Abdulrahman Al-had Al-Shaibany ,2017); (Garone et.al., 2019).** Most of the theoretical models developed on technology acceptance and usage, are constructed from psychology and sociology origin. **(Venkatesh, Thong & Xu, 2012).** The point where UAUT is ahead of TAM is the inclusion of facilitating conditions construct. This construct is very useful in educational technology acceptance models in a university context, because in a university the technical support, training facility and managerial support is very important, and a big driving factor behind acceptance and usage of any ERP system. All these factors are shown in this model separately. As our research is mainly concentrated on the ERP usage of end users in a university, we have taken factors which are useful in their routine working stage. Here we have omitted attitude from our model and included Behavioural Intention and Usage along with other independent factors to show acceptance of ERP software in a university. Few relationships explained in the model are

pre-established (which are mainly considered from TAM and UTAUT) and others are self-constructed. A brief illustration on all the constructs and their relationships is explained as: -

Technical Support and Behavioural Intension: -

Technical support is the support which we receive from technical team within the university or from external consultant. This construct has different nameology such as vendor support, user support and service quality. In an automated environment, where there is ICT based administrative activities, technical support is considered as a very crucial factor to operate the system on a daily basis. Vendors / external consultants play a very vital role in implementation in a university. They ensure that all the implementation process is done properly and also look into their training and services**(Shatat & Dana, 2016).** Due to lack of technical knowledge of the users, the dependency on service quality/technical support is more in developing countries than in developed countries. **(Semeonegash &Musa, 2010).** In this model technical support is taken as a predictor variable. Behavioural Intension is the degree to which a person formed conscious plans to perform a specific behaviour. **(Cheng-Min Chao, 2019).** Here in this model Behavioural Intension is a mediator variable. Usage/Use is determined by an individual's direct usage of a system for his or her job. This is performed by multiple act or behaviour, which is specific to target, action, context and non-specific in respect to time. In this model Usage is considered as a dependent variable.

The relationship between technical support, behavioural intension and usage explains that in a university if the technical team is found to be knowledgeable and cooperative, then their constant support helps the end users to easily solve their queries about the software and clear doubts about the system. By solving the queries, the idea and understanding about the software becomes clear and they develop interest in using the software. This interest entails a positive impact in the minds of the users, which causes to rapid change in their behaviour, and they develop positive intention to usage. Here the relationship can be hypothesized as:

H: Technical support mediated by Behavioural Intention would lead to better usage.

Top Management Support and Behavioural Intension

Top management support is the help received from top notch in a university to create a favourable environment by building a mutual understanding among the employees for attaining specified goals. It is considered as a strong predictor in all Post Implementation Success (PIS) models. It is also a prerequisite for successful implementation**.** The main task of the top management is to create a favourable environment by building a mutual understanding among the employees for attaining specified goals**(Nejib, 2013)** says there is a positive relationship between TMS and post implementation success (PIS). The higher the top management support the more is the accessibility of the end users regarding the system and vice-versa. **(Mitakos et al., 2010**) focuses on the leadership trait, which can drive top managers to motivate users to use the software efficiently, effectively and with ease. TMS is also the involvement and participation of the executive in the IT development activity. TMS in an organisation has always been the negotiator between business and technology. It is through TMS that any organisation has been able to enhance knowledge.

In this model we establish a relationship between top management support, Behavioural intention and usage, where top management support is considered as a predictor variable, mediated by behavioural intention to usage. In a university environment we notice that the effect of top management support is must to usage, as most of the end users lack technical knowledge. So, through their constant support they can arrange certain facility for the users which can help them understand the system and further motivate them to use it. In a university Top Management support facility vary from users. Not everybody gets equal amount of assistance at the same time. Here this predictor variable

acts more like perceived behavioural control from theory of TPB (Theory of Planned Behaviour) and influence both intention and usage. Thus, in this case the user who has more access to this facility, will develop more intention to usage and vice-versa. Thus, we can hypothesize the relationship as:

H: Top Management Support mediated by Behavioural Intention would lead to better usage

Training and Education, Computer Self-efficacy and Behavioural Intention

Training and education are a must activity post implementation and is considered as strong predictor in most Post Implementation success models. Due to the complexity of ERP, the dedication and involvement of users is very essential in all stages of implementation. Priorly users need to understand the benefits of the system so that the user resistance can be minimized.**(Shatat & Dana, 2016)** Thus training should be conducted regularly to involve the users and get themselves involved in the system and accept the idea of change. Today educational institutions are focussing more on IT to enhance in their learning and training programs. This evolution is called as electronic learning or precisely e-learning. The purpose behind training and education program is to ensure that all the employees are comfortable to use the system and they derive usefulness out of it. As IS has been the need or central focus of all administrative and managerial decision making, it becomes a prime responsibility for organisation to take initiative in the training of users to a better usage**. (Venkatesh & Bala 2008).** Thus, we can hypothesize the relationship as:

H: Training and education mediated by Behavioural Intention would lead to better usage.

Computer Self-efficacy and Behavioural intension

Computer self-efficacy is the individual judgement about their ability to use a particular computer in various situations. Self-efficacy is a good predictor of the perception regarding the ease of computer use **(Cazan et al., 2016). (John, 2015)**.Computer self-efficacy is regarded as an important construct in technology adoption studies. A positive relationship exists between computer self-efficacy and IT adoption. In a university where the end users are expected to be technology less knowledgeable then, constant training sessions could improve the technical knowledge and boost up their computer self-efficacy. A better computer self-efficacy can help an individual develop better perceptions about the system. This can further lead to high intension of using the software causing to usage. Thus, we can hypothesize the relationship as:

H: Computer Self-efficacy mediated by Behavioural Intension would lead to better usage.

Perceived Ease of Use and Behavioural Intension

Perceived Ease of Use is taken here as predictor variables. Perceived Ease of Use is the degree to which a person believes that using a particular system will be free of effort. Perceived Ease of use is named as Effort Expectancy in UTAUT model (II, II, III) respectively. This construct is considered as perception variables.

In this model, we see that perceived ease of use is mediated by behavioural intension to usage. If a user has a clear perception about the system and finds the system easy to use, he will start developing positive ideas in his mind and his behavioural intention to use the system will become more. From this inference we can hypothesize as:

H: Perceived ease of use mediated by behavioural intention would lead to usage

Perceived Usefulness and Behavioural Intension

Perceived Usefulness is the degree to which a person believes that using a particular IS will enhance his/her job performance. In this model it is taken as a predictor variable. Perceived usefulness is named as Performance Expectancy in UTAUT model I, II and III. This construct is considered as a perception variable.

PU is an instrumental belief which can be linked with extrinsic motivation and cognition which is derived after using the system. **Venkatesh and Davis (2000); Zabukovsek, Bobek (2013).** When a user finds the system useful in his job performance his behaviour towards system use will change and he will develop positive intension to use the system. He will automatically derive usefulness out of the system and will find the ERP system useful in his job , which might improve his performance or output. From this inference we can hypothesize as:

H): Perceived usefulness mediated by behavioural intention would lead to usage.

Individual Adaptability and Behavioural Intension: -

Individual adaptability refers to an individual's propensity to change. This is an individual personality dimension. This is a good predictor of change in any Information System success. The extent an individual is able to adapt the new software and accept the change, the favourable will be the situation towards software success/usage.

In this model we see that Individual Adaptability is mediated by Behavioural Intention to usage. In a university, considering the end users the propensity to adapt is not the same within everyone; it varies. Therefore, individuals with high adaptability level will have higher intension to use the software and vice- versa. Behavioural intension in this situation will mediate the relationship, rather having a direct relationship with usage. Hence, we hypothesize as: -

H: Individual adaptability mediated by behavioural intention would lead to usage.

Behavioural intension and Usage

Behavioural Intension refers to an individual's readiness to perform a given behaviour. It is assumed to be a precursor of behaviour. **(Venkatesh, Thong and Xu ,2012).** Usage determines an individual's direct usage of a system for his or her job. This is performed by multiple act or behaviour, which is specific to target, action, context and non-specific in respect to time **(Semeon, Negash and Musa ,2010).** Here in this model Behavioural Intension is considered as a mediator variable and Usage as dependent variable. There seems to be a direct relationship between Behavioural Intension and Usage. The relationship has been considered from TAM model. Here instead of attitude behavioural Intension is considered as a mediator variable causing to usage of a system. It can be summarized as, when an individual has developed positive intension, he will definitely be keen to use a particular system and vice-versa. Thus this relationship can be hypothesized as:-

H: Behavioural Intension directly affects usage.

The model considered for the study is illustrated through path analysis diagram using SEM described in structural equation modelling section below.

METHOD

The study has been conducted in one of the largest private technical universities of Eastern India. The large and complex structure of the university led the management to implement ERP for smooth and transparent functioning. The university comprises of 10,000 faculty, administrative and technical staff and 30,000 students. Based on convenient sampling method, data was collected from 221 faculty members. Here Mahalanobis distance analysis were made to eliminate the outliers from the dataset. Finally, 218 data were used for further analysis. A Five-point Likert scale has been selected to measure the variables selected for the study.

DATA COLLECTION

Data was collected personally with the help of a self- constructed questionnaire. A cross-sectional survey was done in all the schools. Around 80% of the data was collected by hard copy distribution, by meeting them personally and 20% was through sending of Google form, which happened with a personal phone call. After data screening and removing the outliers identified through Mahalanobis, a total of 218 responses was used for final analysis process.

MEASURES

The survey questionnaire included demographic measures comprising age, gender, total experience in the current organisation, total ERP experience and total Usage of ERP in a month. The aim of conducting the research was measure the ERP usage of the faculties in KIIT university. The questionnaire comprised of eight predictor variables (viz. Perceived ease of use, perceived usefulness, computer self-efficacy, behavioural intention, top management support, technical support, individual adaptability and training and education) and Usage as a dependent variable.

To start with the analysis a frequency and percentage of all the demographic variables was done which is illustrated in Table 1 below. Along with the frequency % of the demographic variables an ETA test is also done. ETA test was conducted to see how ERP usage vary across age, gender, total KIIT and ERP experience and also among faculties of different schools. The results of frequency % and ETA test is given in Table 1 and Table 2 respectively.

Table 1: Frequency % of Sample Profile

Demographic Variables	Frequency	Percentage (%)
Age		
23-34 years	90	41.3
35-46 years	95	43.6
47-58 years	32	14.7
59-70 years	1	0. 5
Total	**218**	**100**
Gender		
Male	131	60.1
Female	87	39.9
Total	**218**	**100**
Total KIIT Experience		
0-7 years	150	68.8
8-15 years	62	28.4
16-23 years	6	2.8
Total	**218**	**100**
Total ERP Experience		
0-5 years	192	88.1
6-10 years	19	8.7
11-15 years	7	3.2
Total	**218**	**100**
ERP Usage in a month		
0-20 hours	100	45.9
21-40 hours	87	39.9
41-60 hours	22	10.1
61-80 hours	3	1.4

81-100 hours	5	2.3
101-120 hours	1	0.5
Total	**218**	**100**
School / Department of the faculty		
School of Applied Sciences	22	10.1
School of Architecture and Planning	1	0.5
School of Biotechnology	2	0.9
School of Chemical Technology	1	0.5
School of Civil Engineering	15	6.9
School of Computer Applications	9	4.1
School of Computer Science Engineering	25	11.5
School of Electrical Engineering	28	12.8
School of Electronic Engineering	31	14.2
School of Fashion Technology	4	1.8
School of Film and Media Sciences	2	0.9
School of Humanities	2	0.9
School of Law	18	8.3
School of Management	13	6.0
School of Mass Communication	2	0.9
School of Mechanical Engineering	32	14.7
School of Medical Sciences (Pathology)	4	1.8
School of Medical Sciences (Radiology)	5	2.3
School of Social Sciences	2	0.9
Total	**218**	**100**

Source: Primary data collected by author

The demographic distribution presented in Table 1 reveals that there are more Male faculty (60.1%) than females (39.9%). The Age column in the Table reveals the age of the employees which ranges from 23 years to 70 years. From the frequency output we see that the university is mainly employed by faculties whose age ranges between 23-46 years. This can also reveal that university is occupied by not only mid-aged faculties but also fresh pass-out. In this table we have also calculated faculties' total KIIT experience years of experience of the respondents, which ranges between 0 to 23 years in their tenure.

The ERP experience and ERP usage in a month range between (0-15 years) and (0-120 hours) respectively. In which the experience and usage is defined by frequency and percentage explicitly. The data is collected from 18 different schools of KIIT university which is also mentioned in the table with their frequency and percentage. The illustration of ETA test is mentioned below in Table 2 below.

Table 2. Level of ERP Usage across Demographic Variables

Variables	ERP Usage Mean	SD	Eta	Eta Squared	F
Gender					
Male	**9.40**	**3.746**	**.023**	**.001**	**.114**
Female	**9.59**	**3.994**			
Age					
23-34 years	**9.50**	**3.742**	**.052**	**.003**	**.194**
35-46 years	**9.35**	**4.107**			
47-58 years	**9.50**	**3.776**			
59-70 years					
Organisation Experience			**.075**	**.006**	**.611**
0-7 years	**9.67**	**3.870**			
8-15 years	**9.05**	**3.952**			
16-23 years	**9.00**	**4.000**			
Total ERP Experience					
0-5 years	**9.39**	**3.871**	**.125**	**.016**	**1.710**
6-10 years	**9.37**	**4.166**			
11-15 years	**12.14**	**3.078**			

N= 218 Source: Survey data collected by authors

From the above table we can see how the Usage has differed from category of demographic variables. From the Gender category we can see that the usage is slightly more in women than in men, which we can infer that the women faculty are interested and frequent to use the software for their various activities than the men faculty. From the next category of age group, it is seen that the usage is more in the age group (23-34 years) and (47-58 years). From this we can perceive that the young faculty members are keen to learn the software as it is new to them. So, to handle their administrative jobs they login frequently to get a grip of the software and also solve their various issues regarding the software. But with mid-aged faculties of this university, alongside with teaching are also involved in various major administrative roles of their respective schools. To accomplish their tasks, they frequently use the software, which causes to high usage among them. From the next category of organisation experience we see that the first two category i.e. (0-7) years and (8-15 years) have the highest usage, which also signifies the same the new joiners in the university, due to the urge of learning the software use the software frequently; and the mid-aged faculties who has more experience in this university are given other administrative responsibilities which cause to higher usage. From the last category of total ERP experience of the faculties we see that those faculty who has higher ERP software experience (11-15 years) has more usage than the faculties having lesser ERP usage. Thus, we see how usage varies along various categories of demographic variables.

After taking the frequency and percentage of all the demographic variables, a frequency analysis was also run of the scale constructs. Frequency analysis is run to get the number of times variables are occurring their central tendency and also amount of dispersion. The results of frequency analysis is illustrated in Table 3 of our study.

Frequency Analysis: Table No 3

		PU	PEU	CSE	BI	TMS	TS	IA	TE
N	Valid	218	218	218	218	218	218	218	218
	Missing	0	0	0	0	0	0	0	0
Mean		20.19	20.10	10.04	12.90	13.72	17.19	10.30	16.80
Mode		25	24	11	16	16	20	12	20

Std. Deviation	6.238	5.174	3.250	3.731	3.918	4.964	3.397	5.278
Variance	38.918	26.769	10.565	13.922	15.347	24.645	11.539	27.858
Range	24	24	12	16	16	20	12	20
Minimum	6	6	3	4	4	5	3	5
Maximum	30	30	15	20	20	25	15	25

Source: Survey data by author

The next table (Table 4) of this article highlights on the correlation between the variables and the reliability scores. This table shows correlation among 8 variables (Perceived Usefulness (PU), Perceived Ease of Use (PEU), Computer Self-efficacy (CSE), Behavioural Intension (BI), Top Management Support (TMS), Technical Support (TS), Individual Adaptability (IA), Training and Education (TE)) where all the correlation values are > 0.60, which indicates good corelation between all the variables. From the reliability scores column, we see that Cronbach alpha coefficient value is > .850. This can be recommended reliable for commercial purposes **(Carman. 1990)** and is considered good for measurement.

Table 4. Descriptive statistics, correlation and Reliability of studied variables

Scales Taken for study	PU	PEU	CSE	BI	TMS	TS	IA	TE	Scale Reliability
PU	**1**	**.801****	**.661****	**.670****	**.732****	**.770****	**.710****	**.756****	**.952**
PEU	**.801****	**1**	**.723****	**.696****	**.774****	**.792****	**.766****	**.795****	**.931**
CSE	**.661****	**.723****	**1**	**.766****	**.744****	**.808****	**.839****	**.725****	**.857**
BI	**.670****	**.696****	**.766****	**1**	**.730****	**.780****	**.765****	**.740****	**.855**
TMS	**.732****	**.774****	**.744****	**.730****	**1**	**.874****	**.784****	**.829****	**.914**
TS	**.770****	**.792****	**.808****	**.780****	**.874****	**1**	**.823****	**.868****	**.946**
IA	**.710****	**.766****	**.839****	**.765****	**.784****	**.823****	**1**	**.757****	**.933**
TE	**.756****	**.795****	**.725****	**.740****	**.829****	**.868****	**.757****	**1**	**.974**

p<.01, ***p<.001; ***Source: Survey data by author*

EXPLORATORY FACTOR ANALYSIS: -

An exploratory Factor analysis is also done on all the 8 factors considered in the study. Th result of the commonalities indicated values which were less than 0.50 were dropped in the study. SPSS was run again for exploratory factor analysis. KMO test was done to measure sampling adequacy, whose value came as .965. The Bartlett ‘s Test of Sphericity tested whether the correlations between variables are adequately large for factor analysis to be appropriate and it is found to be significant $\chi 2$ (630) = 9658.610, $p < 0.001$, indicating that the correlations within the *R* matrix are sufficiently different from zero to justify factor analysis. To confirm the internal insistency of the items chosen after factor analysis, Composite Reliability, Average Variance Extracted and Discriminant Validity was calculated. All the results i.e., factor loadings, CR, AVE and DV value are shown in Table 5 below.

Table 5. Item-wise Factor Loadings, Composite Reliability, Average Variance Extracted & Discriminant Validity

Factor	Items	Factor Loadings	Composite Reliability	Average Variance Extracted	Discriminant Validity
Perceived Usefulness	Q1 Using the system improves my job performance.	0.94	0.94	0.71	0.84
	Q2 Using the system in my job increases my productivity.	0.95			
	Q3 Using the system enhances my effectiveness in my job.	0.92			
	Q4R I don't find the ERP useful in my job.	0.76			
	Q5 I find the ERP system useful in my daily life.	0.74			
	Q6. Using ERP system increases my chances of achieving things which are important to me.	0.73			
Perceived Ease of Use	Q3. I find it easy to get the ERP system to do what I want it to do	0.74	0.89	0.59	0.77
	Q4. I find it easy to do all my work through ERP system.	0.71			
	Q5. It is easy for me to become skilful at using ERP system.	0.55			
	Q6. I find ERP system easy to use.	0.88			
	Q7 Learning how to use ERP system is easy for me.	0.88			
	Q8.I would find the ERP system to be flexible to interact with.	0.79			
Computer Self-Efficacy	Q2.I can learn to use computers for my various job related and other works.	0.96	0.83	0.63	0.79
	Q3. Working with computers is a fun for me.	0.79			
	Q5R It is tough to learn the new software and tools in computer.	0.58			
Behavioural Intension	Q1 I intend to use the ERP system in the next few months.	0.62	0.86	0.63	0.79
	Q2 I will always try to use ERP system in my daily life.	0.88			
	Q3. I plan to continue to use ERP system frequently.	0.99			
	Q4R. I don't have specific plan to use the ERP system.	0.63			
Training and Education	Q1The training provided to you on ERP system of your university was clear.	0.95	0.93	0.87	0.93
	Q2The training provided to you on ERP system of your university was adequate.	0.95			
	Q3The training provided to you on ERP system of your university was knowledgeable.	0.94			
	Q4The training provided to you				

	on ERP system of your university was comprehensive. Q5. The training provided to you on ERP system of your university was inspiring	0.92 0.91			
Top Management Support	Q1 The top management takes all initiative to solve any issue related to ERP. Q3 The top management encourages usage of ERP system. Q4. Top management provides all sorts of support in the proper functioning of ERP system. Q5R Top management doesn't get much involved in the matters of ERP usage.	0.85 0.94 0.90 0.50	0.87	0.67	0.82
Individual Adaptability	Q2. I am able to adapt to each and every situation. Q3. I am open to new experiences / changes. Q4 I like to explore new technologies.	0.86 0.97 0.97	0.92	0.87	0.93
Technical Support	Q1. The support service system here provides timely service. Q2. The support service providing staffs are courteous. Q3. The staffs have sufficient knowledge to answer any query. Q4. The staff effectively resolve all the issues. Q5R.The support team is not that easily accessible	0.89 0.92 0.92 0.93 0.76	0.95	0.78	0.89

Survey data collected by author

From the above table we see that the factor loadings of each item show value above 0.60 which is considered high loading. The Composite reliability of each factor is above 0.70 which is highly recommendable. The Average Variance Extracted and Discriminant Validity of each Factor is > 0.50 which is also a considerable value.

CONFIRMATORY FACTOR ANALYSIS:

- After getting all the items of the 8 factors model by running a principal component analysis through EFA, with a sample size (N= 218), the next step is to confirm the model using a confirmatory factor analysis (CFA). So confirmatory factor analysis was done for the 8 factors (viz. PU, PEU, CSE, TMS, TS, IA, TE and BI) taken for study. The confirmatory analysis was performed using IBM Amos 26. The results of the confirmatory analysis are discussed below in following sections. Where model detection is the primary requirement of CFA, simultaneously it is important to detect the standardised loadings in AMOS output, to verify the dimensionality of measurement and verify the model fit produced by AMOS. Taking the sample sensitivity and model complexity effect into account, Chi-square/df (CMIN/DF), Comparative fit Index (CFI), initial fit index goodness of fit index (GFI), adjusted goodness of fit index (AGFI) and Root Mean Square Error of Approximation (RMSEA) are considered in this study for evaluating fit indices.

A CFI value of 0.90 or greater is accepted for model fit. The CFI value produced by AMOS in

this study is 0.533, which moderately satisfies the CFI requirement of model fit.

The measure of fit between the hypothesized model and the observed covariance matrix is termed as goodness of fit index (GFI). A cut off value of .90 or large are generally indicates the fitness of the model and acceptable. In this study the GFI= 0.900, which highly satisfies the GFI requirement of model fit.

The adjusted goodness of fit index (AGFI) corrects the GFI which is affected by the number of indicators of each latent variable. Here AGFI is .786 which moderately satisfies the requirement of model fit.

Another popular goodness-of-fit (GOF) index among researchers is root mean square error of approximation (RMSEA) that measures discrepancy per degree of freedom. A RMSEA value closer to zero indicates less variances and co-variances are left unexplained in the model. RMSEA value less than 0.05 is considered as good fit, between 0.05 and 0.08 is considered acceptable fit, between 0.08 and 0.10 is deemed as marginal fit, and a value greater than 0.10 is concluded as poor fit. The Model in our study has an RMSEA value 0.09 which explains marginal fit of the model.

Since the values of all parameters and estimates are positive and significant, the proposed 8 factor model fits the data well and is considered as an acceptable model. In a nutshell, we can say that CFA confirms the eight-factor model of ERP usage in a university context. The values of Model fit summary of SEM analysis is represented in Table 6 below

STRUCTURAL EQUATION MODELLING

After getting all the items of the 8 factors model by running a principal component analysis through EFA, with a sample size (N= 218), a model is developed for the faculties of KIIT university using SEM (Structural Equation Modelling). The model is based upon the information received from different respondents towards their awareness level, the factors affecting ERP usage of the faculties were identified and studied. The model fit indices identified for a measurement model is mentioned below in Table 6:

Table 6: Goodness-of-Fit Indices for The Measurement and Structural Models

S.NO.	Type of measure	Observed values	Level of acceptable fit
I	Absolute Fit Measures:		
1	Root Mean Square Error of Approximation (RMSEA)	0.025	Marginal fit <0.090, Acceptable <0.080, Good fit <0.050
2	$\chi 2$/df (CMIN/DF)	1.196	upper limit 2.0/3.0 or 5
II	Incremental Fit Measures:		
1	Tucker –Lewis Index (TLI)	0.962	>0.90
2	Comparative Fit Index (CFI)	0.993	>0.90
3	Incremental Fit Index (IFI)	0.994	>0.90
4	Normed Fit Index (NFI)	0.966	> 0.90 < 0.95 marginal, > 0.95 is good < 0.90 poor
III	Parsimonious Fit Measures:		
1	Parsimony Normed Fit Index (PNFI)	0.172	0-1

Table 6 above shows the recommended values and test results for these indices. As indicated, all indices exceeded their common acceptance levels, demonstrating that the measurement model exhibited a good fit with the collected data.

MEASUREMENT MODEL: -

The measurement model below shows us the facilitating factors responsible for ERP (here SAP software) usage in a university environment. From the below model we see that the 7 variables viz. Technical Support, Individual Adaptability, Perceived Ease of Use, Perceived Usefulness, Top management support, Computer self-efficacy, training and education directly and positively affects Behavioural Intension, which is considered here as a dependent variable from the model. Again, behavioural intension is seen to directly and positively affect usage. From this relationship we consider behavioural intension as a predictor variable and usage as a dependent variable. From the below model we see that (e1) and (e2) are taken as exogeneous variables also called as error terms. From the path diagram below we can see that (e1) is directly related to Usage with a value 0.149. This means that this exogeneous variable will influence (14.9%) on Usage. Similarly, from the below diag. we see another exogeneous variable named (e2) which has a direct influence on behavioural intension with a value (0.175). This means that this exogeneous variable will influence (0.175%) on behavioural intension. The hypothesis derivation is described below in Table 7 below: -

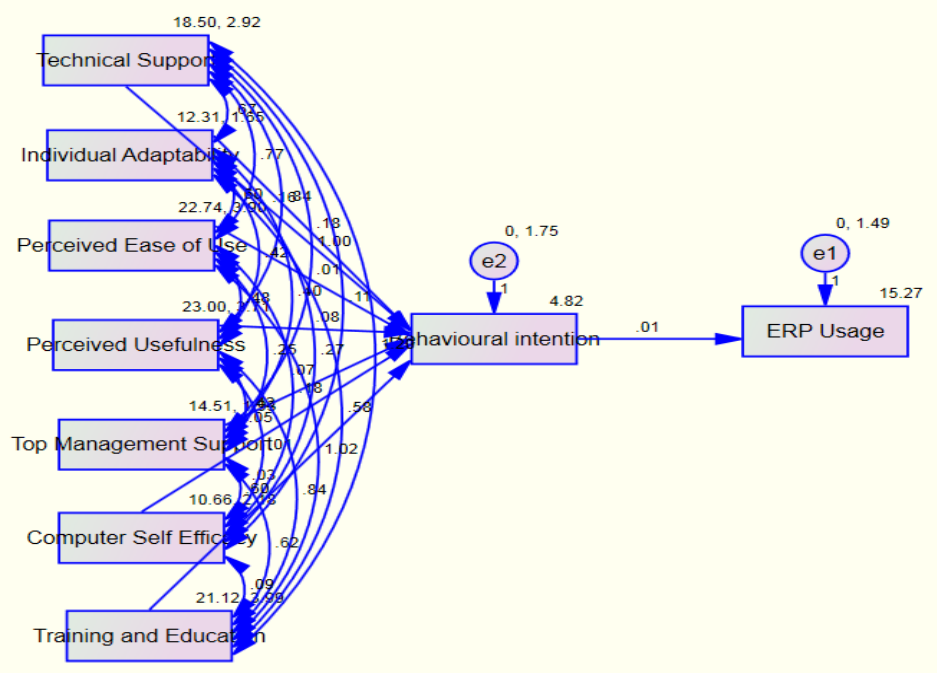

Fig 1 Structural Equation Model Path Diagram

Table 7: HYPOTHESIS TESTING USING STRUCTURAL EQUATION MODEL

Hypotheses testing were done by inspecting the path loadings of each structural relation. Table given below tabulates all the requisite values for the structural model and their hypothesis. The hypothesis derivation is described below as:-

			Estimate	S.E.	C.R.	P	Label
BI	<---	TS	.158	.063	2.502	.012	
BI	<---	IA	.177	.076	2.326	.020	
BI	<---	PEU	.013	.048	.262	.793	

			Estimate	S.E.	C.R.	P	Label
BI	<---	PU	.085	.049	1.725	.084	
BI	<---	TMS	.067	.076	.884	.377	
BI	<---	CSE	.048	.064	.738	.461	
BI	<---	TE	.030	.050	.611	.541	
DV_USAGE	<---	BI	.011	.058	.191	.848	

Discussion and Findings

The study is mainly on the ERP (here SAP) usage of the faculties (end user's) of KIIT university. To study the ERP usage of faculties, seven predictor variables (viz. PU, PEU, TMS, TS, IA, CSE, TE) are taken. Here Behavioural intension acts as a dependent variable which has a direct and positive influence on the seven predictor variables. Again, we see that Behavioural intension acts as a predictor variable and has a direct influence on usage. This conceptual model mainly denotes the variables facilitating to usage in a university environment. The variables are mainly considered from TAM and UTAUT models which are considered as the one of finest tested technology adoption models. It is a behavioural study conducted on the academic staffs of one of the largest privately owned technical educational institute in Eastern India. Since technological invasion in educational sector almost all universities which are in their expansion mode have embraced technology for maintaining their day-today activities and also build a competitive edge.

FINDINGS

To put the findings of this study in other words, it is observed from the model that:

$H_{1:}$ Technical support directly and positively affects behavioural intension. This hypothesis was accepted (p=.012) at 95% confidence interval at 5% level of significance (p>0.05).

H2: Individual Adaptability directly and positively affects behavioural intension. This hypothesis was accepted (p=.020) at 95% confidence interval at 5% level of significance (p>0.05).

H3: Perceived ease of use directly and positively affects behavioural intension. This hypothesis was rejected (p=.793) at 95% confidence interval at 5% level of significance (p>0.05).

H4: Perceived Usefulness directly and positively affects behavioural intension. This hypothesis was rejected (p=0.084) at 95% confidence interval at 5% level of significance (p>0.05).

H5: Top management support directly and positively affects Behavioural Intension. This hypothesis was rejected (p=0.377) at 95% confidence interval at 5% level of significance (p>0.05).

H6: Computer Self Efficacy directly and positively affects behavioural intension. This hypothesis was rejected (p=.461) at 95% confidence interval at 5% level of significance (p>0.05).

H7: Training and Education directly and positively affects Behavioural Intension. This hypothesis was rejected (p=.541) at 95% confidence interval at 5% level of significance (p>0.05).

H8: Behavioural Intension directly and positively affects Usage. This hypothesis was rejected (p=.848) at 95% confidence interval at 5% level of significance (p>0.05).

Here only two hypotheses i.e. (H1 and H2) are accepted and are in positive relationships with each other. The other hypothesis developed were rejected. Thus, considering the constructs, their relationships and impact ratios on each other, we can enumerate that technical support and individual adaptability can be considered further in any study for ERP usage of end users in university context.

Limitation of the study

Although the researcher has been careful in designing the study, certain unavoidable issues

remained as limitation of the study. First, since the study employs a case study method, the generalisability of the findings would be low. Second, the inherent limitation of online method of data collection may influence the findings. Third, there are chances of the impact of social desirability and acquiescence bias owing to higher level of affinity of the respondents. Fourth for any behavioural based study it is also good to do a longitudinal data collection. Due to paucity of time the longitudinal study couldn't be possible.

Future research

After doing an extensive study of the literatures on the usage and successful implementation of ERP in Technical Educational Institutes, many gap areas have been identified which needs to be looked into for successful implementation leading to better usage of the end users.

This study is conducted only on one particular category of end user (i.e., faculty). Future more studies need to be conducted on the other category of end users (i.e., students and non-academic persons) to measure the usage behaviour separately.

This study was done on the technical and human factors causing to usage. Future studies need to conducted on task and system and how these actors can influence and increase benefits in ERP usage . **(Banswal, 2015)**

The university environment is very different from other sectors. So, implementing ERP is a difficult task for the technical team. The modules implemented in a university is also different from the core modules of ERP software. This has many often-caused problems in re-engineering, and due their lack of knowledge about the new modules they lead to implementation failures. But along with technical inadequacy there are also other psychosocial dynamics associated which influence ERP usage in technical institutions.

Since most of the studies are conducted on usage and acceptance of the software, more studies are required to explore psychosocial factors which can lead to ERP usage. The vendors face the problem in reengineering as they lack knowledge on the modules which has primarily become a major cause for technical failure. Along with technical inadequacy there are other psychosocial dynamics which influence ERP usage in technical institutions. Since there are few studies in TEI, more studies are required to explore the psycho-social factors leading to ERP usage.

More studies need to be conducted on the facilitating conditions factors (viz. top management support, technical support, training and education) as these have been proved very strong predictors of usage in a university environment.

Here from the findings, we found that technical support was found as a strong predictor for usage in a university environment. But other constructs like top management support and training and education was not supported. Thus, this gives another area of research where more factors can be considered which can be good predictors to technology usage in a university.

This study was conducted in only one institute of Eastern India. Further a comparative study can be conducted on more institutes in eastern India and then the behavioural pattern can be studied in more detail, as we know usage behaviour varies from person to person.

As the socio-technical system of different organisations differ, case studies can be conducted of different organisations, which will help to throw light on certain ERP success factors.

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