

# ICT Utilization and Performance in Select Institutions of Higher Education in India

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## ABSTRACT

The rapid change in the organizational environment has continuously pushed the need for new technologies to enable the organisations to be more flexible and networked oriented. It has been seen based upon the literature review that information and communication technologies are used by people and organizations for their information processing and communication purposes in a relatively simple and basic manner, however, its utilization has not been so valuable. In this context and background, the present study has aimed at investigating factors affecting ICT utilization and performance in select universities in India under three contexts *viz.*, Individual Context, Task-Technology Context and Organizational Context. The three contexts have been taken into consideration on the basis of assumption that organizations must utilize ICT at different levels, rather than at one level, so as to enhance the performance. For this, sample of 660 valid responses have been collected among the respondent from three select universities of India *viz.*, University of Jammu, Panjab University and University of Delhi. Data thus collected has been analyzed by using different statistical techniques *viz.*, multiple correlation and regression analysis, descriptive statistics, t-test, ANOVA and so forth to find the significant or insignificant impact of various factors on ICT utilization. The findings of the analysis indicates that ICT utilization have been effected in terms of individual factors, factors governing the task at hand *i.e.*, task-technology factors and factors that support the organizations facilitating conditions *i.e.*, organizational factors with in the organizations under study.

**Key Words :** ICT Utilization, Performance, Task-Technology Context, Individual Context, Organizational Context, Higher Education

## INTRODUCTION

In the present context, technological development is considered as an important indicator of performance of an organization to gain competitive advantage. The changing environment has continuously stimulated the organizations towards new technologies so as to make them more flexible and network oriented. Though new technologies are receiving importance in various organisations globally, the higher education sector is also getting effected by the emerging trends in technologies. As a result, the universities are facilitating incorporation of Information and Communication Technologies (ICT)

for better governance and delivery of educational services. Despite the fact that new technologies are being introduced rapidly in the educational organizations, still there is a need to identify the critical factors related to users' acceptance of technology among these organizations (Yi and Hwang, 2003). Therefore, the present study has aimed at investigating factors affecting ICT utilization in select universities in India. Further, the present study has investigated various factors under three contexts *viz.*, Individual Context, Task-Technology Context and Organizational Context. The three contexts have been taken into consideration on the basis of assumption that organizations must utilize ICT at different

levels, rather than at one level, so as to enhance the performance.

From the viewpoint of present research, Individual Context represents the characteristics of an individual which explains the behaviour of an individual related to acceptance or non-acceptance of new technologies (Chau and Hu, 2002a). The individual context suggests that the behaviour of individuals is essential to understand for organizations to increase technology utilization. The Task-Technology Context refers to the characteristics of the task and technology which suggest that technology must meet task-related requirements of the organizations so as to increase ICT usage among individuals which in turn can ultimately affect organizational performance (Yu and Yu, 2010; Goodhue, 1995; Goodhue and Thompson, 1995). The Organizational Context refers to enabling suitable environment of an organization to support acceptance of new technologies (Han, 2003; Lippert and Govindarajulu, 2006). The organizational context suggests that organizations must create a favourable environment to encourage the usage of technology at work. For this, adequate resources and support can help the organizations to meet any challenges of non-acceptance of technology. For identifying the dimensions of three above mentioned constructs, the existing body of literature has been reviewed to evaluate any relationships that exist between them.

Further, the survey instrument has been administered to the respondents of three universities of India *viz.*, University of Jammu, Panjab University and University of Delhi to analyze the perception of respondents towards acceptance as well as usage of new technologies at three different contexts. The reason for selecting these universities as units of analysis is because these are the recognized, public autonomous and premier institutions of higher learning located in the northern region of India, and, thus selected for the purpose of present research. Moreover, a comparative analysis has been conducted between the select educational institutions to analyze the impact of underlying factors on both ICT utilization and organizational performance. After collecting the responses, multivariate techniques of data analysis such as correlation, regression, analysis of variance, exploratory factor analysis, independent sample t-test have been used to analyze the data. The results of these techniques have been analysed and interpreted in the light of research objectives and hypotheses. The outcome of the analysis have indicated that ICT utilization have been

effected in terms of individual factors, factors governing the task at hand *i.e.*, task-technology factors and factors that support the organizations facilitating conditions *i.e.*, organizational factors with in the organizations under study. Further, findings of the study suggest that the organizations under study must concentrate on all three levels, as discussed above, as they have potential of enhancing ICT utilization *vis a vis* performance of the universities.

#### Literature review:

The concept of ICT utilization as explored by various authors in number of previous studies is a significantly researched concept (Taylor and Todd, 1995; Venkatesh *et al.*, 2003; Compeau and Higgins, 1995; Davis, 1989; Szajna, 1996) and has been taken as a dependent variable in most of the empirical studies (Bokhari, 2005). Mathieson and Keil (1998) suggested that individuals who utilize technology that is available to them are able to perform tasks more efficiently and effectively than individuals who do not. Goodhue and Thompson (1995) have observed that, for a technology to positively impact performance, it must not only be utilized but also fit the needs of the user, as a good fit increases the impact of performance of the user. In this context, Goodhue (1992) has indicated that utilization is made up of factors related to technology characteristics and individual performance.

Multiple theories of technology acceptance *viz.*, TRA, TPB, DTPB, IDT, TAM, TAM2, UTAUT and TTF have been reviewed that employed variables useful in the examination of technology utilization. These theories examined the differences in technology users' attitudes and involvement, and suggested that an individual's intention to use a specific technology predict the actual usage of that technology which result in an improvement in performance. According to Venkatesh *et al.* (2003), "researchers are confronted with a choice to pick and choose constructs among a multitude of models or must choose a favourable model and largely ignore the contributions from alternative models". Therefore, selecting an appropriate model that can guide management to take action has always remained a critical task for information system researchers. Keeping this view in mind, comparison between the theories of technology acceptance have been reviewed. The comparison and common criticism of these theories provides key strengths for presenting the conceptual framework and also facilitates the elaboration of results

and future directions.

Further, to understand the usage of new technologies among individuals, Chau and Hu (2002a) proposed a framework suggesting that an individual's acceptance behaviour is influenced by factors pertaining to the individual context, the technological context and the implementation context. Similarly, Han (2003) has interpreted user behaviour within at least four contexts: individual context, technology context, organisational context and cultural context, where a context refers to the interrelated conditions in which the behaviour exists or occurs (Webster, 2006). Sun and Zhang (2006) broadly categorized these variables into three groups *viz.*, Organisational, Technological and Individual. Each of these contexts make an important and unique contribution to the existing literature on user acceptance of information technology.

The Individual Context refers to those essential characteristics of individual users that are related to technology usage (Chau and Hu, 2002a). The individual characteristics have been differentiated into two variables: Demographics and Psychographics (Van *et al.*, 2006). Though large number of studies have shown that demographic characteristics of the users influence the acceptance of technology (Brosnan, 1999; Eriksson-Zetterquist and Knights, 2004; Gefen and Straub, 1997; Hitt and Frei, 2002; Im, Bayus and Mason, 2003; Karacmandic, 2004; Morris *et al.*, 2005). However, the predictive validity of demographic variables remain limited and they often do not provide an insight into why individuals do or do not accept a technology. While psychographic variables are more difficult to measure, requiring more in-depth tests than demographic variables. However, they provide better insights into why people do or do not accept technologies. Further, since the theories and models of technology acceptance have specific characteristics and significant benefits in predicting and explaining the usage behaviour of an individual (Kripanont, 2006), still, the most challenging issue in the study of information and communication technologies is to understand the behaviour of individuals related to acceptance or non-acceptance of new technologies (Swanson, 1988).

The Task-Technology Context refers to the characteristics of the task and technology itself in which decision to use ICT is based on an individual expectations that the technology may have some impact on the task (Goodhue and Thompson, 1995). Tasks are defined as

“the actions carried out by individuals in turning inputs into outputs in order to satisfy their information needs and tasks characteristics include those that might move a user to rely more heavily on certain aspects of information and communication technologies” whereas “technology refers to computer systems (hardware, software and data) and user support services (training, help lines etc.) provided to assist users in their tasks and the characteristics of technology are viewed as tools used by individuals in carrying out their tasks” (Goodhue and Thompson, 1995). In order to obtain a better understanding about Information and communication technologies to support organizational tasks, the idea of task-technology-fit (TTF) provides a suitable starting point. TTF is concerned with the extent to which technology meets task-related requirements (Yu and Yu, 2010). In other words, TTF is a construct that offers practical guidance for the design of a technology or task in terms of achieving an optimal level of fit. In this context, a general theory of task-technology-fit has been developed by (Goodhue, 1995; Goodhue and Thompson, 1995). This theory suggests that TTF is a suitable concept to predict the usage and resulting performance impacts of information systems; as it measures the degree to which the technology helps a user to perform a given task. Goodhue and Thompson (1995) have identified eight dimensions of fit as perceived by the users, including several measures for the quality and accessibility of data in an information system, ease of system use, system reliability, and the relationship between the information systems group and system users. Several studies conducted in different contexts have found that task-technology-fit explain the usage of technology better than task and technology variables alone (Dishaw and Strong, 1999; Klopping and McKinney, 2004; Staples and Seddon, 2004; Kuo and Lee, 2011; Junglas and Watson, 2003; Ferratt and Vlahos, 1998; Kanellis *et al.*, 1999).

The Organizational Context defined as “the resources available to support the acceptance of new technologies within an organization” (Lippert and Govindarajulu, 2006). Though several theoretical models have been developed from theories in psychology and sociology, used to evaluate and test individual-level acceptance of technologies. But the Unified theory of acceptance and use of technology (UTAUT) has distilled the critical factors and contingencies related to the prediction of behavioral intention to use a technology primarily in organizational contexts (Venkatesh *et al.*,

2012). Moreover, in order to increase the user acceptance of technology, organizations have to create a favourable environment to support and encourage usage of technology at work (Han, 2003). According to the author, organization's computing policy, support and encouragement empirically have been found to be very important for the adoption of new technologies. Similarly, various other studies have found that organizational parameters such as social influences within the organization, training on technology use, communication and resource facilitation are some important organizational factors for technology adoption and utilization (Van Ittersum *et al.*, 2006).

Though research on the acceptance of information technology is considered to be one of the most influential research within modern information system literature (Hu *et al.*, 1999; Benbasat and Zmud, 1999), still, the selection of an appropriate model or constructs from a number of multitude models is a persistent problem for researchers in making decision to introduce new technologies in organisations (Venkatesh *et al.*, 2003). Moreover, large number of theories and models posed difficulties when selecting an appropriate model for accomplishing the objectives of the study. For instance, if a single model is selected for a specific objective or context then it seems to be ignorant of the other models' contribution and also it is not necessary for the constructs within the selected model to perform equally as they were applicable in previous studies. It is also observed from literature that selecting a specific model may produce overflow and underflow conditions within the analysis process (Bagozzi, 1992). Therefore, one possible solution for this problem can be the selection of various constructs from multitude models and integration of them into an extended model. But, selecting a number of theories and constructs of interest with warranted theoretical underpinnings is considered to be a challenging task (Venkatesh *et al.*, 2003). Although, previous researches on the acceptance of information technology have focused on numerous factors affecting the acceptance of technology in various domains, however, understanding the impact of these factors at different level still requires more research and analysis, thus, becomes a major gap in the present body of knowledge.

Further, a great amount of the research on technology acceptance have been carried out in the developed countries such as in U.S. and outside the U.S., because many technology acceptance theories and

models have been developed mostly in the U.S. (Pavlou and Chai, 2002; Choi and Geistfield, 2004; Jarvenpaa and Leidner, 1999; Shih and Fang, 2004; Alsajjan and Dennis, 2010; Oh *et al.*, 2003; Choudrie and Lee, 2004; Khoubati *et al.*, 2007, Wu *et al.*, 2007; Straub *et al.*, 1997; Hu *et al.*, 2003; McCoy *et al.*, 2007). However, very few studies have been done on technology acceptance and use in the organizations in the Indian context, thus, necessitating an in depth study on ICT utilization particularly in context to higher education sector. Moreover, it has been noted that, despite huge investment by the government of India into IT to promote the usage of new technologies within the higher educational institutes, a very low acceptance or adoption rate has been observed. The present study has tried to address this gap in the existing literature.

In this context and background, the present study has proposed following hypotheses based on extensive literature:

H<sub>1</sub>: Individual characteristics have a positive impact on ICT utilization.

H<sub>2</sub>: Task and Technology characteristics positively affect the ICT usage in organizations.

H<sub>3</sub>: Organizational context is significantly related to ICT Utilization.

H<sub>4</sub>: Utilization of ICT has a significant influence on performance.

### Objectives of the study:

The objectives of the study are as follows:

1. To evaluate impact of various factors on ICT utilization in select organisations.
2. To evaluate the effect of ICT utilization on organizational performance.
3. To examine impact of the individual, task-technology fit and organizational facilitating conditions on performance.
4. To undertake comparative study of ICT utilization amongst select universities and its impact on organizational performance.

## METHODOLOGY

### Sampling design:

The target population or the universe of the study comprises of all stakeholders of the select universities which use ICT for academic and educational purposes. In this study, three universities of India *viz.*, University of Jammu, Panjab University and University of Delhi

have been selected as sampling units and students as well as faculty working in these institutions have been considered as the target population of the sampling units. A total sample size of 1100 has been calculated for data collection and stratified sampling technique has been selected to collect data for the purpose of present study. As per the calculated sample size, questionnaires have been distributed amongst the respondents of the universities. Out of which 800 filled questionnaires have been collected, however, after initial analysis of raw data only 660 valid responses (220 from each university) have been obtained for the purpose of data analysis.

**Instrument development:**

The instrument has been developed from previous literature review with modifications to fit the specific context on ICT utilization in higher education. The final instrument has contained 65 statements under five sections along with five statements consisting of demographic information as presented in Table 1.

**Reliability and validity:**

In order to check the internal consistency of the

scale, the most commonly used psychometric measure of reliability *i.e.*, Cronbach’s alpha has been used (Nunnally, 1994; Kim and Cha, 2002; Sekaran and Bougie, 2016). The value of cronbach’s alpha ( $\alpha$ ) value has been calculated for each item and then the item-total statistics has been analyzed for the scale, the statements were accordingly deleted till the time the value of cronbach alpha came in between the acceptable range of 0.70 to 0.95 (Tavakol and Dennick, 2011).

After reliability analysis, validity of the instrument has been assessed to determine whether the instrument measures what it is actually intended to measure (Golafshani, 2003). For overall validity check, content and construct validity have been evaluated. Content validity for the current work has been assessed through review of literature and discussions with the subject experts. On the basis of suggestions received, the instrument has been revised. Construct validity has been used to assess whether the instrument is actually measuring what it claims to measure. Both Convergent and discriminant validity have been processed to confirm the appropriateness of the instrument. Convergent validity is a measure used to assess the degree to which two

**Table 1: Structure of Final Questionnaire**

Constructs	No. of items	Sources
<b>Section I- Demographics</b>		
Gender	1	Self-Developed
Class	1	Self-Developed
Age	1	Self-Developed
Education	1	Self-Developed
Organisation	1	Self-Developed
<b>Section II: Individual Context</b>		
Belief	5	Taylor and Todd (1995a), Venkatesh <i>et al.</i> (2003), Pierce and Ball (2009),
Attitude	4	Siragusa and Dixon (2008), Dishaw and Strong (1999), Kuo and Lee
Behavioural Intention	3	(2011), Kripanont (2007), Beckett (2007), Park (2009)
Subjective Norm	4	
Self-Efficacy	3	
<b>Section III: Task-Technology Context</b>		
Ease of Use	4	
Compatibility	3	Goodhue (1998), Moore and Benbasat (1991)
Accessibility	3	
<b>Section IV: Organizational Context</b>		
Facilitating Conditions	8	Thompson <i>et al.</i> (1991), Abdulwahab and Dahalin (2010), Chang and
Training	6	Cheung (2001), Lin (2007), Amoako and Salam (2004), Abugabah <i>et al.</i>
Image	4	(2010), Taylor and Todd (1995), Kripanont (2007), Moore and Benbasat
Social Influence	2	(1991)
<b>Section V: ICT Utilization</b>		
ICT Use	6	Kripanont (2006, 2007)
<b>Section VI: Organizational Performance</b>		
Performance	10	Abugabah <i>et al.</i> (2010)

measures of the same construct are correlated. Significant high correlations between the items of same dimension indicate that the scale is measuring its concept (Hair *et al.*, 2009). Discriminant Validity refers to the extent to which items of one latent variable are not related to other latent variable. It has been evaluated by using principal component method of factor analysis with varimax rotation. By and large, an instrument is considered to exhibit satisfactory discriminant validity when measurement items load highly (*i.e.*, loadings of 0.5 or above) on the respective constructs than on others (Nguyen and Aoyama, 2014). The results of the factor analysis for each of the scales fulfilled the basic requirements of KMO value being greater than 0.70, eigen value > 1, total variance extracted = 50% and factor loading > 0.5 (Hair *et al.*, 2009). Therefore, in order to establish uni-dimensionality of constructs and thereby the discriminant validity of the instruments, only those items have been retained that loaded highly on a single factor (Gerbing and Anderson, 1988).

## RESULTS AND DISCUSSION

### Testing of Hypotheses:

The study has proposed four hypotheses for testing and validation. The findings of the same are presented as below.

#### *H<sub>1</sub>: Individual Characteristics have a positive impact on ICT Utilization:*

The above hypothesis has been tested with the help of regression analysis to show the strength of relationship between individual characteristics (IC) and ICT utilization (UT) as presented in Table 2.

The results of the regression analysis show that Individual characteristics explain a significant amount of variance (41.7%) in the utilization of new technologies with ( $R^2 = 0.417$ , Adjusted  $R^2 = 0.416$ ,  $F = 471.255$ ,  $p <$

.001). Further, correlation coefficient ( $R=0.646$ ) indicates a moderate and a positive relationship between individual characteristics and ICT utilization. The unstandardized coefficient for individual characteristics implies that for a one unit increase in individual characteristics, 0.830 units increase in the ICT utilization can be expected. Thus, the following regression model equation has been derived on the basis of above results.

$$UT = 0.733 + 0.830 IC$$

where, UT = ICT Utilization and IC = Individual Characteristics

Overall, the results show a significant and a positive impact of individual characteristics on ICT utilization with ( $\beta = 0.646$ ,  $t = 21.708$ ,  $p < 0.001$ ). Therefore, it supports the hypothesis  $H_1$  that *Individual characteristics have a positive impact on ICT utilization*. Hence, accepted.

With testing of hypothesis  $H_1$ , the study has helped in establishing the true nature of relationship between Individual characteristics and ICT utilization by proving a significant positive association between them. Moreover, the study also clarified the contribution of each dimension of individual context construct towards the utilization of new technologies in the organizations. Behavioural intention of individuals has been found as the highest contributing factor ( $\beta = 0.265$ ;  $p = 0.000$ ) followed by Subjective norms ( $\beta = 0.263$ ;  $p = 0.000$ ), Belief ( $\beta = 0.194$ ;  $p = 0.000$ ) and then Attitude ( $\beta = 0.120$ ;  $p = 0.000$ ). However, self-efficacy has been found as the weakest predictor of ICT usage ( $\beta = 0.041$ ;  $p = 0.241$ ). Therefore, the findings indicate that acceptance and usage of new technologies can be enhanced by increasing the intention, attitude, belief and subjective norms amongst the respondents in select organizations, whereas self-efficacy is not playing an important role on the part of increasing ICT usage amongst the respondents of select universities.

#### *H<sub>2</sub>: Task and Technology Characteristics positively*

**Table 2: Regression Analysis of Individual Characteristics and ICT Utilization**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
IC -> UT	0.646	0.417	0.416	0.464	
Sum of Squares	Df	Mean Square	F	Sig.	
Regression	101.394	1	101.394	471.255	.000
Residual	141.573	658	0.215		
Total	242.967	659			
Unstandardized Coefficients		Standardized Coefficients			
B	Std. Error	Beta	T	Sig.	
Constant	0.733	0.149	4.931	.000	
IC	0.830	0.038	0.646	21.708	.000

**affect the ICT Usage in Organizations:**

For testing the hypothesis, regression analysis has been performed to show the nature of relationship between Task-Technology characteristics (TTC) and ICT utilization (UT) as shown in Table 3.

The results of the regression analysis show that Task-technology characteristics explain a significant amount of variance in ICT utilization with ( $R^2 = 0.350$ , Adjusted  $R^2 = 0.349$ ,  $F = 354.628$ ,  $p < .001$ ). The value of correlation coefficient ( $R = 0.592$ ) indicates a moderate and a positive relationship between task and technology characteristics and ICT utilization. Thus, the model is statistically significant and indicates that the variation in ICT utilization up to 35% is caused by the characteristics of tasks as well as technology. Further, the unstandardized coefficient implies that for a one unit increase in the Task-Technology characteristics, 0.683 units increase in the ICT utilization can be expected. Thus, the following regression model equation has been derived on the basis of above results.

$$UT = 1.301 + 0.683 \text{ TTC}$$

where, UT = ICT Utilization and TTC = Task-Technology Characteristics

Overall, the results show a significant and a positive impact of task and technology characteristics on ICT utilization with ( $\beta = 0.592$ ,  $t = 18.832$ ,  $p < 0.001$ ). Thus, supports the hypothesis  $H_2$  that *Task and Technology characteristics positively affect the ICT usage in organizations.*

The acceptance of hypothesis  $H_2$  supports the literature not merely by establishing a positive and significant relationship between task-technology characteristics and ICT utilization but also clarifying the contribution of task and technology characteristics in enhancing ICT usage in select universities. The study has found that Compatibility ( $\beta = 0.416$ ;  $p = 0.000$ ) between task requirement and technology use is playing

the most important role for increasing the technology usage in universities followed by Ease of use ( $\beta = 0.261$ ;  $p = 0.000$ ) of technology and then Accessibility ( $\beta = 0.083$ ;  $p = 0.021$ ) of information by using suitable ICT. Thus, the findings indicate that organizations selected for the study can enhance the usage of new technologies by increasing the task and technology characteristics viz. compatibility, ease of use and accessibility because these characteristics help the organizations in establishing task-technology-fit.

**$H_3$ : Organizational Context is significantly related to ICT Utilization:**

The hypothesis has been tested by applying regression analysis which shows the nature of relationship between Organizational characteristics (OC) and ICT utilization (UT). The results of regression analysis presented in Table 4 indicates that Organizational characteristics explain a significant amount of variance in ICT utilization with ( $R^2 = 0.259$ , Adjusted  $R^2 = 0.258$ ,  $F = 230.126$ ,  $p < .001$ ).

The value of correlation coefficient ( $R = 0.509$ ) indicates a moderate and positive relationship between OC and UT, significant at 0.001 level. The R square value of 0.259 indicates that the variation in ICT utilization up to 26% is caused by the organizational characteristics. Further, the unstandardized coefficient implies that for a one unit increase in the organizational characteristics, 0.565 units increase in the ICT utilization can be expected.

From the above analysis, the regression model equation has been derived as:

$$UT = 1.874 + 0.565 \text{ OC}$$

where, UT = ICT Utilization and OC = Organizational Characteristics

Overall, the results show a significant and a positive impact of organizational characteristics on ICT utilization with ( $\beta = 0.509$ ,  $t = 15.170$ ,  $p < 0.001$ ). Therefore, supports

**Table 3: Regression Analysis of Task-Technology Characteristics and ICT Utilization**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
TTC -> UT	0.592	0.350	0.349	0.490	
Sum of Squares	Df	Mean Square	F	Sig.	
Regression	85.088	1	85.088	354.628	.000
Residual	157.879	658	0.240		
Total	242.967	659			
Unstandardized Coefficients		Standardized Coefficients			
B	Std. Error	Beta	t	Sig.	
Constant	1.301	0.141	9.207	.000	
TTC	0.683	0.036	0.592	18.832	.000

the hypothesis  $H_3$  that *Organizational Context is significantly related to ICT Utilization.*

With the acceptance of hypothesis  $H_3$ , the study has made an important contribution towards literature by establishing a positive and significant relationship between organizational characteristics and ICT utilization. Thus, indicating that organizational characteristics play an important role for increasing technology acceptance with in the organizations. Moreover, the study also clarified the contribution of each characteristic of organizational context towards the utilization of new technologies in the organizations. The study has found that Social influence affects ICT utilization to a greater extent ( $\beta = 0.356$ ;  $p = 0.000$ ), which indicates that peers such as co-workers, students and staff of the universities can be an important source to influence the organizations towards acceptance of new technologies. It is then followed by Image ( $\beta = 0.315$ ;  $p = 0.000$ ) and Facilitating conditions ( $\hat{\alpha} = 0.126$ ;  $p = 0.004$ ) provided by the organizations under study. However, Training is found as the weakest predictor for increasing ICT usage ( $\beta = -0.075$ ;  $p = 0.086$ ). Therefore, the findings indicate that ICT usage can be encouraged by providing organizational support, resources, facilities and favourable conditions to the respondents in the organizations.

**$H_4$ : Utilization of ICT has a significant influence on Performance:**

For testing the hypothesis, regression analysis has been applied to show the strength of relationship between the dependent variable Performance (PER) and the independent variable ICT utilization (UT). The results of the regression analysis are presented in Table 5.

It has been depicted from the table that the analysis yielded a regression function with ( $R^2 = 0.423$ ; Adjusted  $R^2 = 0.422$ ;  $F = 482.285$ ;  $p < 0.001$ ). The regression model indicates a significant positive relationship ( $R = 0.650$ ,  $p = 0.000$ ) between ICT Utilization and Performance of the organizations. The R square value of 0.423 indicates that 42.3% of variation in organizational Performance is caused by the Utilization of information technologies. Further, the unstandardized coefficient implies that for one unit increase in the ICT utilization, 0.626 units increase in the organizational performance can be expected. Thus, the following regression model equation has been derived on the basis of above results.

$$PER = 1.482 + 0.626 UT$$

where, PER = Performance and UT = ICT Utilization.

Overall, the results show a significant and a positive impact of ICT utilization on Performance of the

**Table 4: Regression Analysis of Organizational Context and ICT Utilization**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
OC -> UT	0.509	0.259	0.258	0.523	
Sum of Squares	Df	Mean Square	F	Sig.	
Regression	62.956	1	62.956	230.126	.000
Residual	180.011	658	0.274		
Total	242.967	659			
Unstandardized Coefficients		Standardized Coefficients			
B	Std. Error	Beta	T	Sig.	
Constant	1.874	0.138	13.632	.000	
OC	0.565	0.037	0.509	15.170	.000

**Table 5: Regression Analysis of ICT Utilization and Performance**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
UT -> PER	0.650	0.423	0.422	0.444	
Sum of Squares	Df	Mean Square	F	Sig.	
Regression	95.276	1	95.276	482.285	.000
Residual	129.989	658	0.198		
Total	225.265	659			
Unstandardized Coefficients		Standardized Coefficients			
B	Std. Error	Beta	T	Sig.	
Constant	1.482	0.114	13.042	.000	
UT	0.626	0.029	0.650	21.961	.000



organisations with (Beta = 0.650, t = 21.961, p < 0.001). Therefore, supports the hypothesis H<sub>4</sub> that *Utilization of ICT has a significant influence on Performance*. Therefore, H<sub>4</sub> stands accepted.

With the acceptance of hypothesis H<sub>4</sub>, the study has made an important contribution towards literature by establishing a positive and direct relationship between ICT utilization and performance of the organizations. Moreover, it has been found that ICT utilization has a greater impact on performance of the organizations. This implies that increasing utilization of new technologies is believed to have a more direct effect on the performance of the organizations. Further, the results are consistent with the previous studies conducted in the higher education context, found that utilization of ICT has a significant and positive effect on performance (Youssef and Dahmani, 2008; Osang, 2015).

**Achievement of objectives of the study:**

The objectives of the present study have been achieved by applying various statistical techniques. The findings of their achievements are presented as below.

**Objective 1: To evaluate impact of various factors on ICT utilization in the select organisations:**

Factors of the present study have been identified with the help of Exploratory Factor Analysis, conducted separately on each of the three main constructs viz., i) Individual Context construct under which five factors have been extracted namely Belief, Attitude, Behavioural Intention, Subjective Norms and Self-Efficacy with (KMO=0.882, eigen value >1, factor loadings =0.5 and total variance extracted =58.412%), ii) Task-Technology Context construct under which three factors have been extracted namely Ease of use, Compatibility and Accessibility with (KMO=0.855, eigen value >1, factor loadings = 0.5 and total variance extracted =62.984%) and iii) Organizational Context in which four factors have been extracted namely Facilitating Conditions, Training, Image and Social Influence with (KMO=0.915, eigen value >1, factor loadings = 0.5 and total variance

extracted =59.341%). The resultant factors are having KMO > 0.6, eigen values > 1, factor loadings > 0.5 and total variance extracted > 50% (Hair et al., 2010), indicate that the data is valid and used for analysis purposes. After EFA, organization wise regression analysis has been performed separately on Individual, Task-Technology and Organizational factors with ICT utilization. The results of the regression analysis of Individual context factors in three select Universities are presented in Table 6a.

The Table indicates that the dimensions of individual context are more closely associated with ICT utilization in case of Panjab University (R=0.723, R<sup>2</sup>=0.523, F=46.936, p=0.000) followed by the University of Jammu (R=0.680, R<sup>2</sup>=0.462, F=36.761, p=0.000) and then Delhi University (R=0.621, R<sup>2</sup>=0.385, F=26.800, p=0.000). This implies that individual factors cause 52.3% variation in the utilization of new technologies in Panjab University, 46.2% variation in ICT usage in the University of Jammu and 38.5% variation in ICT utilization in Delhi University. Moreover, the contribution of each factor of individual context towards the ICT utilization in each of the select organisations is presented in Table 6b.

It has been analysed that among various factors of individual context, Behavioural Intention has maximum contribution towards ICT utilization in Jammu University (Beta=0.281, p=0.000), Subjective norms has highest contribution in ICT utilization in Panjab University (Beta=0.380, p=0.000) and Belief has maximum contribution for ICT use in Delhi University (Beta=0.284, p=0.000). Moreover, it has been found that each variable of Individual Context construct plays an important role for increasing ICT usage among the respondents of the University of Jammu. However, in Panjab University and Delhi University, Attitude and Self-Efficacy are not contributed significantly towards ICT utilization. Therefore, organizations must need to increase their focus on these two determinants which help to enhance the self-confidence and skills among individuals for using new technologies at the individual level.

After individual context, organization wise regression

**Table 6a: Organization Wise Regression Analysis of Individual Context and ICT Utilization**

University	R	R Square	Adjusted R Square	Std. Error of the Estimate	F Value	Sig.
Jammu	.680	.462	.449	.412	36.761	.000
Panjab	.723	.523	.512	.463	46.936	.000
Delhi	.621	.385	.371	.475	26.800	.000

Predictors: (Constant), Self-efficacy, Attitude, Subjective norms, Behavioural intention, Belief

analysis has been performed on Task-Technology Context and ICT utilization as presented in Table 6c.

The results from the Table 6c indicate that dimensions of Task-Technology context have close association with ICT utilization in case of Panjab University ( $R=0.689$ ,  $R^2=0.475$ ,  $F=65.453$ ,  $p=0.000$ ) than in University of Jammu ( $R=0.614$ ,  $R^2=0.377$ ,  $F=43.611$ ,  $p=0.000$ ) and Delhi University ( $R=0.596$ ,  $R^2=0.355$ ,  $F=39.600$ ,  $p=0.000$ ). This indicates that task-technology factors cause 47.5% variation in the utilization of new technologies in Panjab University, 37.7% variation in ICT usage in the University of Jammu and 35.5% variation in ICT utilization in Delhi University.

In addition, the contribution of each factor of Task-Technology context towards the ICT utilization is presented in Table 6d, indicates that among three factors of Task-technology construct, Compatibility has greater significant contribution towards ICT utilization in three select Universities with the highest beta value in Panjab University ( $Beta=0.470$ ,  $p=0.000$ ), followed by next higher in Delhi University ( $Beta=0.433$ ,  $p=0.000$ ) and

then in Jammu University ( $Beta=0.370$ ,  $p=0.000$ ). This implies that ICT usage is highly affected in Panjab University because of high compatibility between tasks to be accomplished by using suitable technology.

Besides Compatibility, Ease of Use is also significantly contributed towards ICT Utilization in select universities. This indicates that individuals can retrieve information conveniently and easily by using appropriate technology, thus, helps in enhancing ICT usage in the organizations. However, Accessibility have significant impact on ICT Usage in Jammu University but not significantly contributed in Panjab as well as in Delhi Universities. Therefore, the findings reveal that all three factors of Task-Technology construct are significantly contributed towards effective utilization of ICT in the University of Jammu. However, an increased focus on Accessibility can help Panjab University as well as Delhi University too to increase ICT utilization at the task-technology level.

Finally, organization wise regression analysis has been applied on Organizational Context and ICT utilization

**Table 6b: Regression Coefficients: Individual Context and ICT Utilization**

University	Variables	Unstandardized Coefficients		Standardized Coefficients	T Value	Sig.
		B	Std. Error	Beta		
Jammu	(Constant)	.690	.242		2.850	.005
	Belief	.115	.058	.124	1.972	.050
	Attitude	.134	.056	.149	2.411	.017
	Behavioural intention	.234	.050	<b>.281</b>	4.673	.000
	Subjective norms	.197	.060	.208	3.253	.001
	Self-efficacy	.148	.049	.177	2.987	.003
Panjab	(Constant)	.500	.256		1.955	.052
	Belief	.183	.061	.187	3.023	.003
	Attitude	.079	.059	.072	1.329	.185
	Behavioural intention	.275	.061	.274	4.469	.000
	Subjective norms	.354	.058	<b>.380</b>	6.135	.000
	Self-efficacy	-.014	.050	-.016	-.272	.786
Delhi	(Constant)	1.024	.280		3.659	.000
	Belief	.254	.063	<b>.284</b>	4.007	.000
	Attitude	.120	.061	.120	1.963	.051
	Behavioural intention	.233	.057	.258	4.067	.000
	Subjective norms	.172	.065	.171	2.651	.009
	Self-efficacy	-.016	.060	-.017	-.260	.795

**Table 6c: Organization Wise Regression Analysis of Task-Technology Context and ICT Utilization**

University	R	R Square	Adjusted R Square	Std. Error of the Estimate	F Value	Sig.
Jammu	.614	.377	.369	.441	43.611	.000
Panjab	.689	.475	.468	.484	65.153	.000
Delhi	.596	.355	.346	.484	39.600	.000

Predictors: (Constant), Accessibility, Compatibility, Ease of use

in the organizations under study. The results presented in Table 6e indicate that Organizational factors are more closely related with ICT Utilization in case of Panjab University ( $R=0.666, R^2=0.443, F=42.834, p=0.000$ ) than in University of Jammu ( $R=0.534, R^2=0.286, F=21.486, p=0.000$ ) and Delhi University ( $R=0.566, R^2=0.320, F=25.392, p=0.000$ ). This implies that organizational factors cause 44.3% variation in the

utilization of new technologies in Panjab University, 28.6% variation in ICT usage in the University of Jammu and 32% variation in ICT utilization in Delhi University.

Moreover, the contribution of each factor of Organizational Context towards the ICT utilization is presented in Table 6f. It has been analysed that among the factors of Organizational construct, Social influence has greater significant contribution towards ICT utilization

**Table 6d: Regression Coefficients: Task-Technology Context and ICT Utilization**

University	Variables	Unstandardized Coefficients		Standardized Coefficients	T Value	Sig.
		B	Std. Error	Beta		
Jammu	(Constant)	.994	.260		3.820	.000
	Ease of use	.191	.060	.198	3.193	.002
	Compatibility	.324	.051	.370	6.401	.000
	Accessibility	.240	.052	.269	4.614	.000
Panjab	(Constant)	.986	.226		4.356	.000
	Ease of use	.282	.068	.274	4.123	.000
	Compatibility	.416	.051	.470	8.093	.000
	Accessibility	.058	.059	.061	.995	.321
Delhi	(Constant)	1.606	.235		6.847	.000
	Ease of use	.285	.068	.293	4.164	.000
	Compatibility	.373	.053	.433	7.047	.000
	Accessibility	-.038	.052	-.050	-.736	.462

Dependent Variable: ICT Utilization

**Table 6e: Organization Wise Regression Analysis of Organizational Context and ICT Utilization**

University	R	R Square	Adjusted R Square	Std. Error of the Estimate	F Value	Sig.
Jammu	.534	.286	.272	.473	21.486	.000
Panjab	.666	.443	.433	.499	42.834	.000
Delhi	.566	.320	.307	.498	25.292	.000

Predictors: (Constant), Social Influence, Image, Facilitating Conditions, Training

**Table 6f: Regression Coefficients: Organizational Context and ICT Utilization**

University		B	Std. Error	Beta		
Jammu	(Constant)	2.148	.222		9.682	.000
	Facilitating conditions	.192	.071	.227	2.712	.007
	Training	-.166	.063	-.209	-2.637	.009
	Image	.169	.050	.232	3.352	.001
	Social influence	.274	.056	.335	4.912	.000
Panjab	(Constant)	.904	.239		3.778	.000
	Facilitating conditions	.129	.068	.131	1.905	.058
	Training	.067	.061	.073	1.092	.276
	Image	.262	.046	.331	5.731	.000
Delhi	Social influence	.350	.056	.353	6.265	.000
	(Constant)	1.811	.244		7.430	.000
	Facilitating conditions	.064	.063	.077	1.021	.308
	Training	-.084	.060	-.112	-1.401	.163
	Image	.262	.046	.352	5.651	.000
	Social influence	.341	.056	.383	6.133	.000

Dependent Variable: ICT Utilization

in three select Universities with the highest beta value in Delhi University ( $Beta=0.383, p=0.000$ ), followed by next higher in Panjab University ( $Beta=0.353, p=0.000$ ) and then in Jammu University ( $Beta=0.335, p=0.000$ ).

Additionally, it has been found that each dimension of Organizational Context plays an important role for increasing ICT usage among the respondents of the University of Jammu. However, Facilitating Conditions and Training do not have significant contribution towards ICT utilization in Panjab as well as in Delhi Universities. Therefore, an increased focus on organisational facilitating conditions as well as training related to the use of ICT can help these universities to enhance the usage of information technologies.

To sum up, the findings reveal that various factors that have been identified in the study have significant impact on ICT utilization in the University of Jammu. Whereas as some factors are not playing a significant role to enhance the utilization of new technologies in Panjab University and Delhi university. Therefore, the organizations need to improve these determinants so as to increase ICT usage among individuals.

**Objective 2: To evaluate the effect of ICT utilization on organizational performance:**

The second objective of the study corresponds to hypothesis  $H_4$  which indicates that there is positive association between ICT Utilization and Performance of the organizations with correlation coefficient ( $R=0.650$ ). Further, the analysis reveals that 42.3% of variation in organizational Performance is caused by the

utilization of information technologies ( $R^2 = 0.423$ ; Adjusted  $R^2= 0.422$ ;  $F = 482.285$ ;  $p < 0.001$ ). The beta value ( $\beta = 0.650, P < 0.001$ ) indicates that ICT Utilization is significantly contributes in enhancing the Performance of the organizations. Moreover, organization wise regression analysis of ICT Utilization and Performance have been presented in Tables 7a and 7b, respectively.

The results indicate that ICT utilization highly affects the Performance of Panjab University ( $R=0.717, Adjusted R^2=0.512, F=231.183, \beta=0.717, p=0.000$ ) followed by the University of Jammu ( $R=0.633, Adjusted R^2=0.397, F=145.485, \beta=0.633, p=0.000$ ) and Delhi University ( $R=0.600, Adjusted R^2=0.357, F=122.745, \beta=0.600, p=0.000$ ). Thus, it has been found that utilization of new technologies have significant and positive effect on the Performance of all three select universities. Further, the table indicates that the utilization of new technologies are highly contributing in enhancing the performance of Panjab University ( $Beta=0.717, p=0.000$ ), followed by the University of Jammu ( $Beta=0.633, p=0.000$ ) and then Delhi University ( $Beta=0.600, p=0.000$ ). This implies that increasing utilization of new technologies can have a direct impact on performance of the organizations under study.

**Objective 3: To examine impact of the individual, task-technology fit and organizational facilitating conditions on performance:**

The objective has been analysed by applying correlation and multiple regression analyses techniques.

**Table 7a : Organization Wise Regression Analysis of ICT Utilization and Performance**

University	R	R Square	Adjusted R Square	Std. Error of the Estimate	F Value	Sig.
Jammu	0.633	0.400	0.397	0.433	145.485	.000
Panjab	0.717	0.515	0.512	0.433	231.183	.000
Delhi	0.600	0.360	0.357	0.460	122.745	.000

Predictors: (Constant), ICT Utilization

**Table 7b: Regression Coefficients: ICT Utilization and Performance**

University	Variable	Unstandardized Coefficients		Standardized Coefficients	t Value	Sig.
		B	Std. Error	Beta		
Jammu	(Constant)	1.489	0.209		7.120	.000
	ICT Utilization	0.637	0.053	0.633	12.062	.000
Panjab	(Constant)	1.330	0.175		7.616	.000
	ICT Utilization	0.670	0.044	<b>0.717</b>	15.205	.000
Delhi	(Constant)	1.615	0.209		7.722	.000
	ICT Utilization	0.575	0.052	0.600	11.079	.000

Dependent Variable: Performance

The results of correlation analysis reveal that all independent factors viz., Belief, Attitude, Behavioural intention, Subjective norm, Self-efficacy, Ease of use, Compatibility, Accessibility, Facilitating conditions, Training, Image and Social influence have significant positive correlations with Performance of the organisations within the acceptable limits of 0.05 and 0.01 at 95% and 99% level of significance. Further, a high relationship has been found between Behavioural Intention and Performance (0.669), whereas, relationship between Training and Performance is minimum (0.357). Thereafter, organization wise regression analysis has been performed separately on Individual, Task-Technology and Organizational factors with respect to Performance. For this, the data file has been split on the basis of select Universities. The results of the regression analysis of Individual context factors in the select Universities are presented in Table 8a.

From the above analysis, it has been found that the dimensions of Individual Context are highly associated

with Performance of Panjab University ( $R=0.764$ ,  $Adjusted R^2=0.574$ ,  $F=60.052$ ,  $p=0.000$ ) followed by the University of Jammu ( $R=0.759$ ,  $Adjusted R^2=0.566$ ,  $F=58.032$ ,  $p=0.000$ ) and Delhi University ( $R=0.726$ ,  $Adjusted R^2=0.516$ ,  $F=47.655$ ,  $p=0.000$ ). The results show a strong and positive relationship between individual characteristics and performance of the select universities. Moreover the contribution of each factor of individual context towards the Performance of each organization is presented in Table 8b.

The table above reveals that out of the factors of individual context construct, Behavioural Intention has maximum contribution in enhancing the performance of three select universities with highest contribution in Jammu University ( $Beta=0.486$ ,  $p=0.000$ ), followed by Delhi University ( $Beta=0.464$ ,  $p=0.000$ ) and then Panjab University ( $Beta=0.407$ ,  $p=0.000$ ). After Behavioural intention, Subjective norm is the next higher contributing factor for increasing the performance of three select universities. However Belief, Attitude and Self-

**Table 8a: Organization Wise Regression Analysis of Individual Context and Performance**

University	R	R Square	Adjusted R Square	Std. Error of the Estimate	F Value	Sig.
Jammu	.759	.576	.566	.368	58.032	.000
Panjab	.764	.584	.574	.404	60.052	.000
Delhi	.726	.527	.516	.400	47.655	.000

Predictors: (Constant), Self-efficacy, Attitude, Subjective norms, Behavioural intention, Belief

**Table 8b: Regression Coefficients for Individual Context and Performance of Organizations**

University	Variables	Unstandardized Coefficients		Standardized Coefficients	T Value	Sig.
		B	Std. Error	Beta		
Jammu	(Constant)	.605	.216		2.797	.006
	Belief	.098	.052	.105	1.879	.062
	Attitude	.067	.050	.074	1.350	.179
	Behavioural intention	.407	.045	.486	9.095	.000
	Subjective norms	.237	.054	.250	4.387	.000
	Self-efficacy	.047	.044	.057	1.075	.284
Panjab	(Constant)	.463	.223		2.074	.039
	Belief	.142	.053	.156	2.696	.008
	Attitude	.082	.052	.080	1.584	.115
	Behavioural intention	.381	.054	.407	7.116	.000
	Subjective norms	.222	.050	.255	4.409	.000
	Self-efficacy	.065	.043	.080	1.499	.135
Delhi	(Constant)	.745	.235		3.167	.002
	Belief	.134	.053	.156	2.509	.013
	Attitude	.011	.051	.011	0.210	.834
	Behavioural intention	.403	.048	.464	8.340	.000
	Subjective norms	.150	.055	.156	2.749	.006
	Self-efficacy	.121	.051	.140	2.390	.018

Dependent Variable: Performance

Efficacy towards ICT use are not playing a significant role in enhancing the performance of select organizations. Thus, an increased focus on Belief, Attitude and Self-Efficacy can help the universities too to increase the Performance at the individual level.

After Individual Context, organization wise regression analysis has been performed on Task-Technology Context with Performance. The results are shown in Table 8c below.

The results indicate that the dimensions of Task-Technology Construct viz. Accessibility, Compatibility and Ease of use are more closely related with the Performance of Panjab University ( $R=0.778$ ,  $Adjusted R^2=0.600$ ,  $F=110.397$ ,  $p=0.000$ ) followed by Delhi University ( $R=0.675$ ,  $Adjusted R^2=0.448$ ,  $F=60.349$ ,  $p=0.000$ ) and then Jammu University ( $R=0.639$ ,  $Adjusted R^2=0.400$ ,  $F=49.580$ ,  $p=0.000$ ). Thus, shows a strong and positive relationship between Task-Technology construct and performance of Panjab University. In addition, the contribution of each factor of Task-Technology context towards the Performance of select organizations is presented in Table 8d.

From the above analysis, it has been found that among the factors of Task-Technology context, Compatibility has maximum contribution in enhancing the

performance of three select universities with highest contribution in Panjab University ( $Beta=0.582$ ,  $p=0.000$ ), next higher in Delhi University ( $Beta=0.451$ ,  $p=0.000$ ) and then in Jammu University ( $Beta=0.428$ ,  $p=0.000$ ). Besides Compatibility, Ease of use and Accessibility also have significant contribution to enhance the performance of Jammu University and Delhi University. However, Accessibility is not significantly contributed to enhance the performance of the Panjab University. Thus, increased focus on the Accessibility construct can help the Panjab University to increase the Performance at the Task-Technology level.

In addition to Individual and Task-Technology Contexts, regression analysis has also been applied on Organizational Context with respect to Performance of the organizations under study. The results are presented in Table 8e.

The results of regression analysis indicate that the dimensions of Organizational Context viz., Social Influence, Image, Facilitating Conditions and Training are more closely associated with the Performance of Panjab University ( $R=0.691$ ,  $Adjusted R^2=0.468$ ,  $F=49.141$ ,  $p=0.000$ ), followed by Delhi University ( $R=0.553$ ,  $Adjusted R^2=0.292$ ,  $F=23.631$ ,  $p=0.000$ ) and then the University of Jammu ( $R=0.531$ ,  $Adjusted R^2=0.269$ ,

**Table 8c: Organization Wise Regression Analysis of Task-Technology Context and Performance**

University	R	R Square	Adjusted R Square	Std. Error of the Estimate	F Value	Sig.
Jammu	.639	.408	.400	.433	49.580	.000
Panjab	.778	.605	.600	.392	110.397	.000
Delhi	.675	.456	.448	.426	60.349	.000

Predictors: (Constant), Accessibility, Compatibility, Ease of use

**Table 8d: Regression Coefficients: Task-Technology Context and Performance**

University	Variables	Unstandardized Coefficients		Standardized Coefficients	T Value	Sig.
		B	Std. Error	Beta		
Jammu	(Constant)	.966	.255		3.785	.000
	Ease of use	.185	.059	.191	3.157	.002
	Compatibility	.376	.050	.428	7.583	.000
	Accessibility	.216	.051	.241	4.240	.000
Panjab	(Constant)	.933	.183		5.093	.000
	Ease of use	.231	.055	.241	4.179	.000
	Compatibility	.481	.042	.582	11.576	.000
	Accessibility	.069	.047	.077	1.445	.150
Delhi	(Constant)	1.256	.207		6.080	.000
	Ease of use	.197	.060	.211	3.274	.001
	Compatibility	.373	.047	.451	7.997	.000
	Accessibility	.126	.046	.170	2.744	.007

Dependent Variable: Performance

$F=21.150, p=0.000$ ). Thus, a strong and positive relationship has been found between organizational characteristics and performance of Panjab University. In addition, the contribution of each factor of Organizational Context towards the Performance of select organizations is presented in Table 8f.

Moreover, it has been found that while Social Influence is contributed to a greater extent to enhance the Performance of Jammu University ( $Beta=0.390, p=0.000$ ) as well as Delhi University ( $Beta=0.321, p=0.000$ ), Image makes the highest significant contribution towards the Performance of Panjab University ( $Beta=0.305, p=0.000$ ). However, Training have no significant impact on performance of the organizations under study. In addition, Facilitating conditions are also contributed significantly towards the performance of Panjab University as well as the University of Jammu, while it is not affecting the performance of Delhi University.

Overall, the findings reveal that at the Individual level, Behavioural intention towards ICT utilization is playing the most important role for increasing the performance

of select universities. This implies that the respondents intend to use ICT as the increased use of new technologies might help them in accomplishing their tasks easily and quickly, which also help in enhancing performance. With respect to Task-Technology characteristics, Compatibility between tasks achieved with the help of appropriate technology has been found to be the most important factor for increasing the performance of select universities. At Organizational level, Social influence is greatly affected the performance of the University of Jammu and the University of Delhi. However, Image is playing an important role in enhancing the performance of Panjab University.

**Objective 4: To undertake comparative study of ICT utilization amongst select universities and its impact on organizational performance:**

First of all, overall ICT Utilization based on six indicator items as mentioned in the study has been compared amongst select Universities with the help of arithmetic mean. The organization wise descriptive statistics regarding overall ICT Utilization has been

**Table 8e: Organization Wise Regression Analysis of Organizational Context and Performance**

University	R	R Square	Adjusted R Square	Std. Error of the Estimate	F Value	Sig.
Jammu	.531	.282	.269	.477	21.150	.000
Panjab	.691	.478	.468	.452	49.141	.000
Delhi	.553	.305	.292	.483	23.631	.000

Predictors: (Constant), Social Influence, Image, Facilitating Conditions, Training

**Table 8f: Regression Coefficients: Organizational Context and Performance**

University	Variables	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
Jammu	(Constant)	2.155	.224		9.630	.000
	Facilitating conditions	.202	.071	.237	2.825	.005
	Training	-.125	.064	-.156	-1.965	.051
	Image	.083	.051	.113	1.630	.105
	Social influence	.321	.056	.390	5.704	.000
Panjab	(Constant)	1.056	.217		4.877	.000
	Facilitating conditions	.251	.061	.274	4.102	.000
	Training	.067	.055	.078	1.206	.229
	Image	.225	.041	.305	5.447	.000
	Social influence	.245	.051	.264	4.845	.000
Delhi	(Constant)	1.699	.236		7.192	.000
	Facilitating conditions	.112	.061	.140	1.838	.067
	Training	.038	.058	.053	.658	.511
	Image	.176	.045	.247	3.920	.000
	Social influence	.274	.054	.321	5.089	.000

Dependent Variable: Performance

presented in Table 9a.

The organization wise descriptive statistics indicate that mean scores for ICT Utilization is highest in the University of Delhi (*Mean=3.98*), followed by the University of Jammu (*Mean=3.92*), and then in Panjab University (*Mean=3.91*). This implies that respondents of the University of Delhi are highly inclined towards utilizing new technologies for educational and administrative purposes. Further, to ascertain whether there is any statistical significant mean difference amongst universities with regard to the utilization of ICT, one-way ANOVA has been performed. The results are presented in Table 9b.

The result shows no significant differences exist between means ( $F=0.892$ ,  $p=0.410$ ) regarding ICT Utilization amongst the universities. This implies that respondents of the universities are highly stimulated for using new technologies. Moreover, comparison between the universities have been analysed in terms of factors

influencing ICT Utilization. Table 9c presents the mean values of Individual factors, Task-Technology factors and Organizational factors with regard to the utilization of new technologies amongst select universities.

While comparing ICT usage at the Individual level, it has been found that respondents from the University of Jammu are using new technologies at a higher rate (*Mean=3.89*) followed by the respondents from Panjab University (*Mean=3.85*) and then University of Delhi (*Mean=3.84*). Moreover, among the variables of individual context, intention towards ICT utilization is of highest relevance to the respondents from Jammu University (*Mean=4.06*), whereas maximum weightage has been given to Attitude towards ICT use by the respondents from Panjab University (*Mean=4.10*) as well as Delhi University (*Mean=4.13*). Further, there are no significant mean differences ( $F=0.896$ ,  $p=0.409$ ) exist among the respondents of three select universities towards ICT utilization at an individual level.

**Table 9a: Organization Wise Descriptive Statistics of ICT Utilization**

University	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
Jammu	3.92	0.555	0.037	3.85	4.00	2.00	5.00
Panjab	3.91	0.663	0.045	3.82	4.00	1.00	5.00
Delhi	3.98	0.599	0.040	3.90	4.06	1.00	5.00

**Table 9b: ANOVA: ICT Utilization with Respect to Select Universities**

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	0.658	2	0.329	0.892	0.410
Within Groups	242.309	657	0.369		
Total	242.967	659			

**Table 9c: Organization Wise Factorial Mean Values**

Factors		Jammu University	Panjab University	Delhi University
Individual Context	Belief	3.78	3.72	3.67
	Attitude	4.05	4.10	4.13
	Behavioural Intention	4.06	4.05	4.05
	Subjective Norm	3.85	3.78	3.72
	Self-Efficacy	3.74	3.61	3.61
	Total	3.89	3.85	3.84
Task-Technology Context	Ease of Use	3.83	3.93	3.93
	Compatibility	3.90	3.83	3.75
	Accessibility	3.92	3.85	3.79
	Total	3.88	3.87	3.82
Organizational Context	Facilitating Conditions	3.66	3.54	3.50
	Training	3.65	3.57	3.50
	Image	3.63	3.55	3.52
	Social Influence	3.89	3.94	3.87
	Total	3.71	3.65	3.60



Similarly, by comparing ICT usage at Task-Technology level, it has been found that the respondents of Jammu University are highly motivated to use ICT (Mean=3.88) as compared to the respondents of Panjab University (Mean=3.87) and University of Delhi (Mean=3.82). Moreover, among the dimensions of Task-Technology-Fit, Accessibility of accurate information by using appropriate technology is to be considered as an important construct by the respondents of Jammu University (Mean=3.92) for using new technologies at a higher rate. Whereas, Ease of use of ICT has been given maximum weightage (Mean=3.93) by the respondents from Panjab as well as Delhi Universities, indicating that ease of use of ICT increase the utilization of new technologies in the organizations. Further, like individual context, no significant mean differences ( $F=0.751$ ,  $p=0.472$ ) exist among the respondents of select universities towards ICT utilization at task-technology level.

Finally, comparison of ICT usage has been done at Organizational Context, indicates that organizational context has given high importance towards ICT utilization at the University of Jammu (Mean=3.71). Moreover, at organizational level, Social influence has been found as the highest motivating factor for ICT usage in all three universities considered highly relevant by the respondents of Panjab University (Mean=3.94), followed by the University of Jammu (Mean=3.89) and Delhi University (Mean=3.87). Further, results of one-way ANOVA indicate insignificant mean differences ( $F=2.374$ ,  $p=0.094$ ) exist among the respondents of select universities towards ICT utilization at organizational level.

Thereafter, impact of ICT Utilization on Performance of the select universities have been compared. This has already been discussed under second objective of the study, indicates that ICT usage have direct impact on organizational performance. However, amongst the select organizations utilization of new technologies have maximum contribution in enhancing the performance of Panjab University ( $\beta=0.711$ ,  $p=0.000$ ). This implies that overall utilization of new technologies have higher impact on the performance of Panjab University.

On the whole, the findings reveal that no significant differences exist between the responses of respondents in all three universities with respect to ICT usage at Individual, Task-Technology and Organizational contexts. Since the select universities are state funded universities

having homogeneous setting, therefore, similar responses have been obtained from the respondents of select organizations.

### Conclusions:

The present study has focused on the adoption and usage of new technologies amongst select universities in India within three contexts *viz.*, Individual Context, Task-Technology Context and Organizational Context. The study indicates that individual characteristics, task-technology-fit and organizational characteristics are crucial for higher usage of technologies which ultimately affects the organisational performance. The study after a systematic data collection, analysis and interpretations has been able to draw conclusions which can have a number of implications for the higher education sector in general and for the universities in particular.

Individual characteristics and task-technology characteristics have been given higher weightage, indicate that the respondents from select organizations are highly inclined towards ICT usage both at individual level and task-technology level. At the Individual level, Behavioural intention, Attitude, Belief and Subjective norms are significantly contributed to increase in ICT usage as well as performance in an organization. Moreover, Behavioural intention has a major influence on ICT utilization amongst select universities. Self-efficacy has insignificant impact on ICT usage, implies that respondents from select universities might need to augment their skills for using new technologies. Therefore, the study concludes that individuals intend to use ICT for academic and educational purposes with a positive attitude which would help in creating favourable atmosphere for achieving their objectives and ultimately enhance overall organizational performance. In addition, the study has proven a positive and significant relationship between Individual characteristics and ICT utilization.

Task and Technology characteristics *viz.* Ease of use, Compatibility and Accessibility play an important role in enhancing ICT utilization in the higher educational institutions. In case of Ease of use, all universities selected for the study have user friendly technologies in order to enhance the confidence of the users. However, the Compatibility issue addresses the fit between user's expectations and the technology delivery and thus, can be labelled as task-technology fit. It has been found that organizations under study have achieved an above average score for the task-technology fit which in other

words can be interpreted as the respondents' positive views towards the fact that the technology available to them fits in their task requirements. However, many respondents feel that it can be further improved in face of changing landscape. Lastly, the third dimension of task-technology context *i.e.* Accessibility is considered to be above average in its overall value which in turn means that the technologies are accessible to the stakeholders in the organizations. However, the same also needs to be augmented further as ease of use and compatibility will have more impact on utilizing new technologies as compared to accessibility. Moreover, a positive and moderate relationship exist between Task and Technology characteristics and ICT usage with respect to educational organizations.

Similarly, Organizational factors *viz.* Social Influence, Facilitating Conditions and Image have been found to be important predictors for explaining the technology adoption. The study has concluded that Social Influence plays an important role in enhancing ICT usage. The respondents perceive that they are influenced by their peer groups to adopt new technologies. Further, Facilitating Conditions, as per the respondents, play a significant role in enabling the stakeholders to adopt ICT. For instance, guidance, specialized instructions, organizational support and extension of resources all contribute significantly towards improving ICT usage. The respondents perceive that the organizations have reasonably good facilitating conditions; however, the peer pressure will have more role to determine the effective technology usage as compared to facilitating conditions. Thereafter, Image has a significant influence on ICT usage in an organization. This implies that ICT usage is significantly related with higher organization status, higher profile and esteem of an organization. The respondents have opined that they perceive Image as a contributing factor in using ICT. Lastly, the respondents feel that the status of Training in their respective organization is low because of several factors *viz.*, inadequate training structures, issues of periodicity, quality in training and lack of skilled trainers etc. the respondents felt that the universities need to not only introduce new technologies but also encourage the stakeholders to keep themselves abreast with latest developments. The study also shows a direct relationship between ICT utilization and organizational performance. This implies that increasing utilization of new technologies can help the organizations to enhance performance.

Overall the study concludes that effective utilization of information technologies is an important indicator that help the organizations to enhance performance at individual, task-technology and organizational levels.

### **Suggestions:**

The present research has recommended numerous suggestions to the educational organizations, based on key findings, for enhancing ICT usage so as to improve organizational performance. The major suggestions have been proposed as given below.

The study has suggested that the higher educational institutions must use information and communication technologies at individual, task-technology and organizational levels so as to attain high performance. In this context, the study recommended that ICT usage can be increased at the individual level by increasing the intention, subjective norms, beliefs and attitude towards ICT in terms of benefits and outcomes of technology utilization. For increasing ICT usage at the individual level, universities can establish a technology enabled network within and outside the organizations; assigning tasks to individuals to be accomplished by using suitable ICT; organize seminars, conferences, workshops and training programmes to gain knowledge about new technologies; provide friendly atmosphere; share experiences with respect to ICT usage; motivate to use ICT in their day-to-day assignments; develop positive and goal oriented attitude among individuals; generate innovative ideas on effective use of ICT; organize lectures conducted by the experts, group discussion sessions and brainstorming sessions on innovative use of technologies. These help in improving knowledge about new technologies, and therefore, encourage the universities for using new technologies at a higher rate, which in turn can help in enhancing the performance. Since individual dimensions play an important role in enhancing the use of new technologies; therefore, organizations should invest efforts and resources in strengthening the determinants of individual context.

After enhancing ICT usage at the individual level, the study suggests that new technologies must be highly used by the organizations at task-technology level to ensure a proper fit between tasks and technology use. This can be done by increasing compatibility between tasks and technology, ease of use of ICT and accessibility of information by using suitable ICT. For increasing ICT usage in context to task and technology, universities must

focus on appropriate ICT that fits well into the workstyle of individuals; provide individuals with ICT that are convenient, easy to learn and can be easily used to extract accurate and relevant information; provide information in useful format, learning new and easy ways of accessing information with the help of suitable technology and timely update the technologies for effective results. Thus, the study recommends that organizations need to strengthen the task-technology characteristics as mentioned above for increasing ICT utilization vis a vis organizational performance.

Finally, the study suggests that in addition to individual and task-technology contexts, organizational environmental conditions also play an important role in enhancing ICT utilization and performance of the organizations. This can be achieved by increasing Social influence, Image and Facilitating conditions towards adoption of technologies in the organizations. Therefore, in order to increase ICT use at organizational level, the universities must encourage knowledge about ICT among people including management, staff, students and colleagues by organizing interactive sessions, orientation programmes and discussion with technical experts; empower individuals for using new technologies so as to build a reputed image in the market place; maintain a healthy culture of using ICT; create favourable environment to support and encourage the use of ICT among individual users; provide technology-enabled devices in labs, offices and classrooms; providing suitable guidance of using these devices; Wi-Fi connectivity both on and off campus along with all necessary resources such as sufficient electricity supply, air conditioned labs with good lighting facility, sufficient work space and so on; provide technical expert persons or groups to assist the individuals concerning ICT difficulties. Thus, it has been suggested that organizations under study must put more emphasis to understand the determinants of organizational context for enhancing ICT usage.

Moreover, the study has found that two factors namely self-efficacy and training are not helping the organizations in increasing the utilization of ICT among respondents. However, these determinants also need attention on the part of increasing performance of the universities. In this regard, the study suggests that the universities can arrange qualitative training programmes by organizing lectures, seminars and workshops on frequent basis; appoint experienced trainers for providing knowledge and guidance in the field of ICT as well as to

provide incentives to the participants for attending these programmes. This would help in increasing self-confidence as well as improving skills and knowledge for using ICT among the stakeholders of organizations.

### **Limitations and Scope for Future Research:**

Although the study has provided interesting findings in terms of utilization of information technologies for increasing the performance of universities in India. However, there are certain limitations, which therefore are relevant for future scope of research.

The present research has focused on the Higher Education Sector which is one of the most emerging sector in knowledge economy. However, future researches can also be carried out for other organizations to study the impact of technology utilization on organizational performance.

In the present research, three state universities of India have been taken up to draw upon the conclusions. As all the universities are homogeneous in setting as being state universities, future research can be carried out by including the private funded universities so as to draw comparison between private and public funded universities.

The study has tried to maintain the objectivity of the research but the element of subjectivity cannot be avoided as responses obtained from the respondents may be prompted by personal likes and dislikes. However, efforts have been made to find out the reliability and validity to overcome the problems to the maximum possible extent.

Finally, the present study has been related to the cross-sectional design in which a sample has been collected over a fixed span of time, the future research can focus on longitudinal studies to take into account the status of ICT utilization at different points in time so as to evaluate the extent of improvements over a period of time.

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