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Determinants of ICT utilization among students and scientists of agricultural universities

¹Priya Pallavi and ²Niva Bara

¹Ph.D. scholar, Department of Agricultural Extension Education, Birsa Agricultural University, Ranchi, Jharkhand, India

²Former Head of Department, Department of Agricultural Extension Education, Birsa Agricultural University, Ranchi, Jharkhand, India

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Corresponding Author: Priya Pallavi

Abstract

ICT has a central role in agricultural education, research and extension. While using ICT tools depends on several socio-personal and institutional factors that affect the user's access, exposure and competence in learning using digital technologies. The present study was performed in three purposively selected agricultural universities (Birsa Agricultural University, Ranchi; Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur; and Bihar Agricultural University, Sabour, Bhagalpur) to assess determinants of ICT use among the students and scientists. The research included 90 students and 60 scientists who were selected from the three universities. This part includes data which were collected using a structured questionnaire, and the analysis was performed with the help of correlation and multiple linear regression. The results showed that among students, age, education level, availability of ICT tools, experience in ICT use and training received on ICT use had significant positive correlation with ICT usage while nature of the residence was found non-significant correlates. Among scientists, both availability of ICT tools and training undergone in use of ICT were found to be significantly associated with level of utilization. The finalised independent variables through multiple regression analysis accounted for 56.34 per cent and 45.62 per cent of the variation in ICT utilization among students and scientists respectively. ICT accessibility, experience and exposure to training are some of the important areas highlighted in this study for effective utilization of ICT tools at agricultural universities. Regular ICT capacity-building programmes accompanied by further fortification of the local infrastructure for IT could raise awareness and positively influence the quest for more extensive use among numerous University stakeholders.

Keywords: Information and communication technology, ICT usage, determinants, correlation analysis, regression analysis, agricultural universities, students, scientists

Introduction

The advent of Information and Communication Technology (ICT) as a game-changing tool to improve the efficiency of agricultural education, research and extension. Rapid digital technology development has fundamentally changed how information is produced, stored, accessed and shared. Internet services, digital libraries, expert systems, geographical information systems, mobile applications and video conferencing such ICT tools as today it has become a mainstay even for academic learning and scientific communication and knowledge sharing.

Agricultural universities have a vital function to play in developing and diffusing agricultural technology. The students and researchers associated with these institutions use ICT tools more and more for data access, do research work, write academic papers, interact with experts and update their knowledge. The adoption of ICT to educational and research activities has led to improved efficiency, expanded access, information, and enabled collaborative learning and research.

The potential for ICT infrastructure is very high but its actual use across the users differs a lot. Owning a tool does not mean you will learn how to use it. There are several

socio-personal, educational and institutional factors that lead to usage of ICT tools at a greater or lesser extent. The way people use ICT is often determined by a multitude of factors which include level of education, the presence or absence of ICT facilities, experience in handling digital technologies and exposure to training.

All studies found strong feedback between access to ICT resources and opportunities for training, and the adoption of digital technologies (using or not using) People with more exposure, experience and technical skill tend to use ICT tools in academics and professions in a better way. Likewise, educational background and access to technological infrastructures can be also a key factor in the effective use of ICT resources.

In order to develop suitable interventions that can enhance these ICT-based education and research systems, it is important to identify the antecedents of ICT utilization. Identification of the factors affecting ICT facility utilization will allow educational administrators, policymakers and extension professionals to devise strategies for increasing access to ICT facilities, conducting training programmes and enhancing digital literacy among stakeholders.

In this regard the present study was conducted to identify

the factors affecting within the domain of ICT use among students and scientists of selected agricultural universities as well as measurement of contribution of selected socio-personal characteristics to the ICT utilization by them.

Materials and Methods

The present study was carried out purposively in three agricultural universities of Bihar i.e. Birsa Agricultural University (BAU), Ranchi; Dr. Rajendra Prasad Central Agricultural University (Dr. RPCAU) Pusa, Samastipur; and Bihar Agricultural University (BAU), Sabour, Bhagalpur. There were two types of respondents in this study, students and scientists. From each university, thirty students were selected (total sample $n = 90$), and twenty scientists were selected (total sample $n = 60$). Hence, total sample size of the study was constituted 150 respondents.

The research design of the study was ex-post facto because the variables in this research had already taken place when it came into existence, that was out of the control of a researcher. A structured pre tested questionnaire was administered to collect the data. The information collected from the respondents was supplemented through techniques of observation, personal interaction and group discussion. The study dependent variable was the level of use of

Information and Communication Technology (ICT) tools. The selected independent variables for the study included age, education, residence, ICT tools available to them, experience related in using ICT tools and training done by respondent in using ICT tools. These variables were chosen based on their likelihood of affecting ICT use by the respondent.

Pearson's correlation coefficient was used to establish the relationship between the chosen independent variables and ICT utilization. Additionally, multiple regression analysis was conducted to evaluate the overall impact of independent variables on level ICT usage by students and scientists. Data were classified and tabulated, and analyzed using appropriate statistical methods. The results were analysed according to the aims of the study.

Results and Discussion

Relationship between Selected Independent Variables and ICT Utilization

The association between the selected independent variables and extent of ICT utilization among students and scientists was analyzed by Pearson's correlation coefficient. The results are summarized in Table 1.

Table 1: Pearson Correlation coefficient(r) between independent variables and dependent variable 'Utilization of ICT tools' of students and scientists of Agricultural Universities

S. N.	Independent variable	Coefficient of correlation (r value)	
		Students	Scientists
X1	Age	0.527**	-0.167 ^{NS}
X2	Education	0.517**	-0.111 ^{NS}
X3	Residential background	0.329 ^{NS}	0.105 ^{NS}
X4	Availability of ICT tools	0.288**	0.192**
X5	Experience related to ICT tools	0.305**	-0.034 ^{NS}
X6	Training undergone in ICT use	0.082*	0.152*

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (1-tailed).

Results showed that age ($r = 0.527$), education ($r = 0.517$), availability of ICT tools and experience related to ICT tools scored a positive and highly significant score with utilization of ICT among students at a significance level of 0.01 (highly significant). The ICT use having undertaken training ($r = 0.082$) also showed a positive and significant relationship at 0.05 level. In comparison, residential background had no statistically significant effect on the usage of ICT.

The positive correlation between age and usage level indicates the fact that respondents with greater maturity and academic-education tend to employ ICT tools effectively. Likewise, among users of ICT resources, higher education was linked with more frequent use due to high academic requirements and information demands. Acquisition and experience related to the use of ICT tools also showed a positive effect on utilization, suggesting that access to technology (technological resources) and familiarity with digital tools contribute decisively to expanding the use of ICT. Theoretical training exposure also supported the utilization of ICT because it built users' knowledge and confidence in managing different ICT applications.

For scientists, availability of ICT tools ($r = 0.192$) and training on usage of ICTs ($r = 0.152$) had positive and significant relationships with utilization on ICTs. However, on the opposite hand age and funds involvement (of others), education different residence pattern and employ experience with ICT have a non-factorial extra impact on place of use for ICT.

The results showed that ICT utilization by scientists was influenced mostly by access to ICT facilities and participations in the training programmes related to ICTs. The non-significant relationship of age, education and experience might be due to the similarity in their profession background as most of the scientists had similar level of education & sufficient amount of experience in their appropriated field.

Contribution of Selected Independent Variables towards ICT Utilization

Multiple regression analysis was carried out to determine the combined contribution of the selected independent variables towards ICT utilization among students and scientists. The results are presented in Table 2.

Table 2: Multiple Regression analysis between independent and dependent variable 'Extent of utilization' of scientists of agricultural universities

S. N.	Independent variable	Students		Scientists	
		Regression coefficient "b value"	"t value"	Regression coefficient "b value"	"t value"
X1	Age	0.327*	1.159	0.108	1.006
X2	Education	1.214*	1.199	1.438	0.764
X3	Residential background	0.136*	1.717	-0.488	-0.506
X4	Availability of ICT tools	0.916**	1.730	2.977**	1.348
X5	Experience related to ICT tools	0.514	0.201	0.838**	0.614
X6	Training undergone in ICT use	0.645**	0.184	0.967**	0.989

*Significant at 0.05 level of probability Multiple R² = 0.5634 Multiple R² = 4562

**Significant at 0.01 level of probability

In the case of students, all six independent variables together explained 56.34 per cent of the variation in ICT utilization. The results indicated that age, education, residential background, availability of ICT tools, experience related to ICT use and training undergone in ICT use contributed positively towards ICT utilization. Among these variables, availability of ICT tools and training exposure emerged as important contributors to the utilization of ICT resources.

The findings suggest that students possessing better access to ICT facilities, greater experience and adequate training opportunities were more likely to utilize ICT tools effectively for academic and educational purposes. The relatively high coefficient of determination indicates that the selected variables were able to explain a substantial proportion of variation in ICT utilization among students.

For scientists, the selected independent variables collectively explained 45.62 per cent of the variation in ICT utilization. Availability of ICT tools, experience related to ICT use and training undergone in ICT use contributed positively and significantly towards ICT utilization, whereas residential background did not contribute significantly.

The results clearly demonstrate that accessibility to ICT facilities and continuous professional training play a crucial role in enhancing ICT utilization among scientists. The findings emphasize the importance of strengthening ICT infrastructure and organizing regular capacity-building programmes to improve effective utilization of digital technologies in agricultural universities.

Conclusion

The study revealed that several socio-personal and ICT-related factors significantly influenced the utilization of ICT tools among students and scientists of agricultural universities. Among students, age, education, availability of ICT tools, experience related to ICT use and training undergone in ICT use exhibited significant positive relationships with ICT utilization, whereas residential background showed a non-significant relationship. In the case of scientists, availability of ICT tools and training exposure emerged as the major factors influencing ICT utilization.

Multiple regression analysis further indicated that the selected independent variables explained 56.34 per cent and 45.62 per cent variation in ICT utilization among students and scientists, respectively. The findings highlight that accessibility to ICT facilities, practical experience and participation in ICT-related training programmes are crucial determinants of effective ICT utilization.

The study emphasizes the need for strengthening ICT infrastructure, improving access to digital resources and organizing regular capacity-building programmes to enhance ICT utilization among stakeholders of agricultural universities. Such initiatives can contribute significantly towards improving the quality of agricultural education, research and knowledge dissemination through effective use of information and communication.

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