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Assessing the Impact of Socio-Personal and Psychological Factors on ICT Knowledge among KVK Personnel

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ABSTRACT

The present study was conducted during 2025–2026 in order to explore the effect of socio-personal and psychological factors on the knowledge about information and communication technology tools among KVK staff in Uttar Pradesh. Ex-post facto research methodology was used in this study, which was conducted among 25 KVKs of Acharya Narendra Deva University of Agriculture and Technology (ANDUAT), Ayodhya. For this purpose, 142 respondents were randomly selected through a multi-stage sampling method. Personal interviews were held with all the selected respondents for data collection with the help of a pre-tested questionnaire. Frequency, percentage, mean, knowledge index, and correlation analysis were used for data analysis. The results showed that most of the respondents were from the middle age group, had high educational status, had medium experience, technological skill, and achievement motivation, while many respondents had high scientific orientation and mass media exposure. Overall knowledge index of the respondents is 85.03%, which signifies a high level of knowledge. High knowledge is associated with the use of basic ICT tools like mobile phone, smartphone, and WhatsApp, while relatively low knowledge is associated with advanced ICT tools including DSS, GIS, GPS, and remote sensing. Correlation analysis indicated that education and experience had strong and significant relationships with knowledge, while other variables showed moderate to low but significant associations. The study highlights the need for strengthening advanced ICT training programmes to enhance the digital competencies of KVK personnel.

Keywords ICT tools, KVK personnel, Knowledge level, Socio-personal factors, Psychological factors, Agricultural extension.

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INTRODUCTION

Agricultural extension plays a vital role in enhancing agricultural productivity by facilitating the transfer of knowledge, technologies, and innovations from research institutions to farming communities. Effective extension systems act as a bridge between scientists and farmers, enabling the dissemination of

location-specific recommendations and improving farm decision-making processes (Anderson and Feder 2007). In developing countries, extension organizations have increasingly adopted innovative approaches to address the growing information needs of farmers and to strengthen the linkage between research and practice (Davis and Addom 2010). In recent years, Information and Communication Technologies (ICTs) have emerged as powerful tools for improving the effectiveness and outreach of agricultural extension services.

ICTs have become effective instruments for transforming agricultural extension systems due to improved accessibility, faster information transmission, and enhanced communication networks. ICT tools such as mobile phones, internet services, smartphones, social media platforms, and digital advisory applications enable effective communication and information sharing among researchers, extension personnel, and farmers (Parvathy *et al.* 2021; Raghuprasad *et al.* 2013). ICT-enabled extension approaches have been recognized as effective mechanisms for enhancing agricultural productivity, improving market access, and supporting informed decision-making among various stakeholders in the agricultural sector (Aker 2011; FAO 2017). The adoption of ICTs in agriculture has encouraged extension systems to move from conventional information dissemination approaches towards technology-driven advisory services capable of addressing the diverse and dynamic needs of farming communities. ICT tools contribute significantly to improving agricultural extension service delivery through real-time information sharing, rapid dissemination of recommendations, and bridging communication gaps between knowledge providers and end users (Thapa *et al.* 2024).

Despite the growing availability and accessibility of ICT tools, their effective utilization largely depends on the knowledge and competency of extension personnel who serve as intermediaries in the transfer of agricultural technologies. Krishi Vigyan Kendras (KVKs), established under the Indian Council of Agricultural Research (ICAR), are frontline agricultural extension institutions mandated to assess, refine, demonstrate, and disseminate agricultural technologies. These centres serve as important linkages between research organizations and farming communities, ensuring effective technology transfer at the grassroots level (Acharya *et al.* 2020). In the era of digital agriculture, KVK personnel are expected to possess adequate knowledge and skills related to ICT tools to effectively perform their extension functions and facilitate technology dissemination among farmers.

The adoption and utilization of ICT tools are influenced by several socio-economic, personal, and institutional factors. Previous studies have reported that factors such as education, experience, resource availability, and socio-economic conditions significantly affect the extent to which agricultural professionals adopt and utilize digital technologies (Mittal and Mehar 2016). Although ICT tools such as mobile phones, internet services, and social media applications are widely used among extension personnel, the adoption of advanced ICT tools and digital decision-support technologies remains limited (Kishor *et al.* 2023). Such disparities indicate the need to assess the level of knowledge possessed by extension personnel regarding various ICT tools. Knowledge of ICT tools is considered a prerequisite for their effective utilization, as it reflects an individual's capacity to understand, interpret, and apply technological information in professional activities. Earlier studies have shown that extension personnel generally possess a moderate level of ICT knowledge, indicating substantial scope for improvement through training and capacity-building interventions (James & Lakshminarayan 2018; Verma *et al.* 2020).

Theoretical perspectives further suggest that the adoption and effective use of innovations are shaped by individual perceptions, communication processes, and social environments. According to the Diffusion of Innovations Theory, individuals differ in their readiness to adopt new technologies, and characteristics such as innovativeness and exposure to information channels significantly influence adoption behavior (Rogers 2003). Similarly, Social Cognitive Theory emphasizes that personal beliefs, motivation, and self-efficacy play a crucial role in determining behavioral outcomes, including the acquisition and application of technological knowledge (Bandura 1986). Consequently, ICT knowledge among exten-

sion personnel is influenced by several socio-personal and psychological factors. Variables such as age, education, professional experience, training exposure, and access to information sources affect an individual's ability to learn and utilize ICT tools effectively. Likewise, psychological characteristics such as achievement motivation, scientific orientation, and innovativeness encourage individuals to adopt and utilize modern technologies more efficiently (Baruah and Mohan 2021).

Although numerous studies have examined ICT adoption and utilization in agriculture, most have focused on farmers or extension services in general, with comparatively limited attention given to the knowledge dimension of ICTs among KVK personnel. Furthermore, the combined influence of socio-personal and psychological factors on ICT knowledge has received inadequate research attention. Therefore, considering the increasing importance of ICT-enabled agricultural extension and the growing need for digitally competent extension personnel, the present study was undertaken to assess the impact of socio-personal and psychological factors on ICT knowledge among KVK personnel.

MATERIAL AND METHOD

The present study was carried out using an ex-post facto research design as propounded by Kerlinger (1964), since the variables under investigation had already occurred and were beyond the control of the researcher. A multi-stage sampling technique, as suggested by Cochran (1977), was employed for the selection of respondents. The operation of Krishi Vigyan Kendras (KVKs) in Uttar Pradesh takes place under different organizations like NGOs, ICAR institutes, State Agricultural Universities, and others. In the present study, the research location chosen purposefully is Acharya Narendra Deva University of Agriculture and Technology (ANDUAT), Ayodhya, Uttar Pradesh, as a number of KVKs function in this location and are involved in extension and ICT-based work. Out of all the KVKs functioning under ANDUAT, all the 25 were considered to be the population of this study. Out of these 25 KVKs, 142 respondents were selected using purposive sampling technique. The sampling frame included KVK personnel working under ANDUAT. The data collection process involved conducting personal interviews with KVK personnel. An interview schedule was developed and administered to collect the necessary information. Two main sections were included in the interview schedule: (i) socio-personal and psychological characteristics of respondents; and (ii) knowledge level of ICT tools. The knowledge level of ICT tools among KVK personnel was measured by administering a structured knowledge test. This knowledge test consisted of a series of questions about ICT tools. Each question had a score of either '1' or '0'. The total knowledge score of each respondent was calculated by adding the scores of all the items. According to the total scores obtained, respondents were classified into low, moderate, and high levels of knowledge by taking mean and standard deviation. Statistical analysis of the data obtained was done by using the appropriate statistical methods. Frequency and percentages were used to analyze the distribution of respondents with respect to the level of knowledge. Individual ICT tool was assessed for its knowledge based on mean scores in descending order of rank. Knowledge Index was developed for each respondent by using the appropriate procedure. Besides, Pearson's product moment correlation coefficient (r) was applied to analyze the relationship between knowledge level of ICT tool and the dependent variable. Correlation coefficients were found significant at 5% level of significance.

RESULT AND DISCUSSION

Respondents' distribution based on their socio-personal, psychological, and communicative attributes is outlined in this section. The section gives an extensive account of factors like age, level of education, experience, ICT training, exposure to mass media, level of technological skill, motivation for achievement, scientific attitude, and innovativeness of KVK staff.

From the Table 1, socio-demographic and psychological characteristics of the respondents, it was clear that most of the KVK members were middle-aged persons who were more engaged in extension activities since there is evidence that shows middle-aged respondents are common in extension programs and they actively participate in organiza-

Table 1. The socio-personal and psychological characteristics of respondents are presented.

Sl. No.	Variables	f	%
1.	**Age**		
	Young (up to 36)	34	23.94
	Middle (37-50)	79	55.64
	Old (51 and above)	29	20.42
2.	**Education**		
	M.Sc. (Ag)	08	05.64
	M.Sc. (Ag)+ NET	11	07.74
	PhD (Ag)	91	64.08
	PhD (Ag)+ NET	32	22.54
3.	**Experience**		
	Up to 05 Year	34	23.94
	06 to 19	77	54.22
	20 years and above	31	21.84
4.	**Training received on ICTs**		
	One Week Training	91	64.18
	Two-Week Training	26	18.30
	Three Week Training	19	13.30
	Four-Week Training	06	04.22
5.	**Mass- media Exposure**		
	Low (Up to 21)	23	16.11
	Medium (22 to 29)	43	30.28
	High (30 and above)	76	53.61
6.	**Technological Skills**		
	Low (Up to 40)	34	23.94
	Medium (41 to 49)	71	50.00
	High (50 and above)	37	26.06
7.	**Achievement Motivation**		
	Low (UP to 32)	41	28.88
	Medium (33 to 37)	75	52.82
	High (38 and above)	26	18.30
8.	**Scientific Orientation**		
	Low (Up to 22)	24	16.90
	Medium (23 to 27)	50	35.21
	High (28 and above)	68	47.89
9.	**Innovativeness**		
	Low (Up to 17)	15	10.56
	Medium (18 to 21)	68	47.88
	High (22 and above)	59	41.56

tional activities (Mohanty *et al.* 2023). It was also evident from the results that most of the respondents had a higher level of education with many having doctoral degrees, meaning that a higher level of education facilitates the ability to understand and use ICT technology. There is evidence that the knowledge level of extension professionals on ICT technologies depends on their socio-personal attributes (Verma *et al.* 2020). Also, the predominance of respondents with medium levels of experience meant that experience facilitated effective participation and performance in extension programs (Mohanty *et al.* 2023). In addition, it was established from the findings that the majority of the participants in this study had undergone short duration ICT training, implying that the KVK staff had little exposure to capacity building programmes; previous studies have indicated that training and institutional support play a significant role in the adoption of digital tools by extension agents (Thapa *et al.* 2024). Moreover, since respondents had a high level of exposure to mass media, it can be inferred that they had more sources to obtain information from, which has a direct impact on ICT tool awareness (Raghuprasad *et al.* 2013). Nevertheless, the fact that most of the respondents had medium level technology skills implies that there is room for improvement, given the fact that the previous studies regarding ICT utilization by extension personnel indicate that the effective use of ICT tools is associated with the level of skills and training (Kishor *et al.* 2023). Furthermore, since most of the respondents were scientifically oriented and innovative individuals, it can be said that they displayed a favorable inclination towards adopting new and improved technologies; previous studies indicate that adoption and extension behavior are positively correlated with the aforementioned variables (Acharya *et al.* 2020).

Aspects-wise knowledge level of KVK personnel

In this section, the knowledge level of KVK staff members related to the ICT tools is described. It describes the level of complete, partial, or no knowledge of KVK staff members related to different types of ICT tools used in agriculture and advisory purposes. From the results obtained from the analysis, an understanding can be gained about the areas in which KVK staff members have good knowledge and the areas

Table 2. The knowledge level of KVK personnel regarding ICT tools is presented.

Sl. No.	Statement	Complete Knowledge		Partial Knowledge		No Knowledge		Mean Score	Rank
		f	%	f	%	f	%		
1.	Operation of mobile phones for delivering agricultural advisories.	118	83.10	20	14.08	04	02.82	1.80	II
2.	Use of smartphones for extension communication and information sharing.	109	76.76	24	16.90	09	06.34	1.70	III
3.	Use of agricultural mobile applications relevant to extension work.	96	67.61	33	23.25	13	09.14	1.58	X
4.	Management of WhatsApp groups for farmer advisory and follow-up.	120	84.51	18	12.68	04	02.82	1.82	I
5.	Use of social media platforms for agricultural awareness creation.	101	71.13	29	20.42	12	08.45	1.63	VII
6.	Preparation and sharing of digital messages, photographs, and videos.	106	74.65	27	19.01	09	06.34	1.68	IV
7.	Conduct of online training programmes for farmers.	88	61.97	36	25.35	18	12.68	1.49	XVI
8.	Use of video conferencing tools for meetings and capacity-building programmes.	92	64.79	31	21.83	19	13.38	1.51	XII
9.	Application of ICT tools for the timely dissemination of agricultural information.	102	71.83	27	19.01	13	09.15	1.63	VI
10.	Use of digital tools for crop and pest problem diagnosis.	97	68.31	30	21.13	15	10.56	1.58	IX
11.	Application of Decision Support Systems (DSS) in agriculture.	75	52.82	39	27.46	28	19.72	1.33	XVIII
12.	Use of weather-based digital advisory systems in extension services.	93	65.49	29	20.42	20	14.08	1.51	XIII
13.	Application of GIS and GPS tools in agricultural planning and monitoring.	70	49.30	43	30.28	29	20.42	1.29	XIX
14.	Use of remote sensing information for crop and resource assessment.	63	44.37	46	32.39	33	23.24	1.21	XX
15.	Maintenance and updating of digital records and farmer databases.	89	62.68	34	23.94	19	13.38	1.49	XV
16.	Use of ICT tools for monitoring and evaluation of extension programmes.	84	59.15	37	26.06	21	14.79	1.44	XVII
17.	Use of ICT tools for documentation and reporting of KVK activities.	101	71.13	26	18.31	15	10.56	1.61	VIII
18.	Role of ICT tools in improving efficiency of extension services.	104	73.24	25	17.61	13	09.15	1.64	V
19.	Use of ICT tools for location-specific and need-based advisory services.	91	64.08	31	21.83	20	14.08	1.50	XIV
20.	Contribution of ICT tools towards enhancing the adoption of agricultural technologies.	98	69.01	28	19.72	16	11.27	1.57	XI

where KVK staff lack knowledge about ICT tools.

Table no 2, referred to as Statement-wise analysis of knowledge about ICT tools among KVK personnel indicated that respondents had a comparatively better knowledge about basic ICT tools such as management of WhatsApp group (Mean score 1.82, Rank I), use of mobile phones (1.80, Rank II), and use of smart

phones (1.70, Rank III). This suggests that extension workers have higher familiarity with common communication tools and technologies which are easier to access. Similarly, Kishor *et al.* (2023) also found that WhatsApp and mobile based ICT tools were the most popular ICT tools among extension workers. Higher level of knowledge about use of ICT for digital content sharing and use of social media further supports growing importance of ICT tools in extension work. Parvathy *et al.* (2021) highlighted that ICT tools improve efficiency and accessibility of information sharing in extension programs. On the other hand, moderate knowledge was also noted in case of online learning, use of video conferencing facilities and weather based advisory services. On the other hand, comparatively less knowledge was observed in more complex and sophisticated ICT tools like Decision Support System (mean score 1.33, rank XVIII), GIS & GPS (mean score 1.29, rank XIX) and remote sensing (mean score 1.21, rank XX), implying less exposure and technical proficiency in advanced technology. This conclusion is consistent with Verma *et al.* (2020) who concluded that the extension personnel had comparatively less knowledge about advanced ICT tools like information kiosk and expert system. The general observation suggests that despite having adequate knowledge in basic ICT tools, the KVK staff lacks advanced ICT tool knowledge. This can be explained by the lack of adequate training and technical competence among the staff since training and skill levels have an important role in the efficient use of ICT tools (Thapa *et al.* 2024).

Table 3. Relationship between selected independent variable and Knowledge level of KVK Personnel.

Sl. No.	Independent Variable	'r' Value
1.	Age	0.53944*
2.	Education	0.74674**
3.	Experience	0.64688**
4.	Training received on ICTs	0.33636*
5.	Mass media exposure	0.42546*
6.	Technological Skills	0.53266*
7.	Achievement Motivation	0.54623*
8.	Scientific Orientation	0.55616*
9.	Innovativeness	0.43755*

*Significant at 5% p value
**Significant at 1% p value

Knowledge index

The knowledge index of KVK personnel regarding ICT tools was calculated by taking into account the weighted score obtained from the responses. Scores of 3, 2, and 1 were assigned to complete knowledge, partial knowledge, and no knowledge responses, respectively. The total obtained score was calculated by summing up (CK×3) + (PK×2) + (NK×1), which was 7245. The maximum possible score was obtained by multiplying the total number of statements (20),

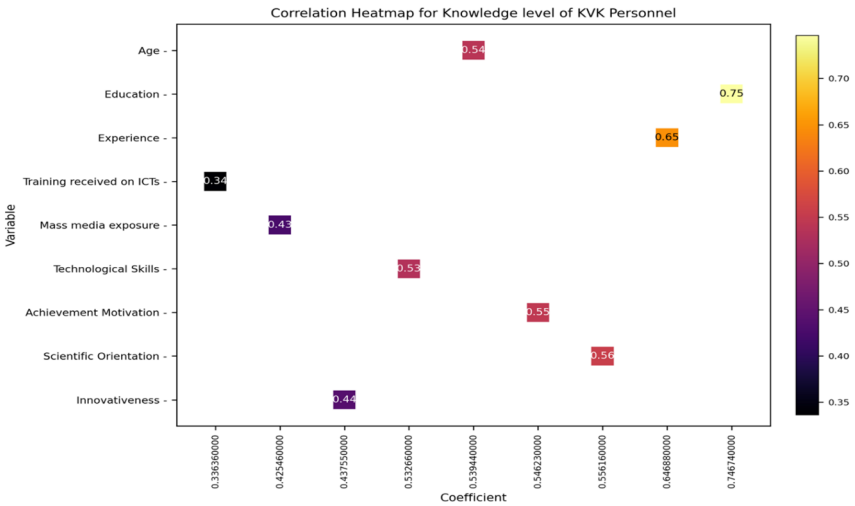

Fig. 1. Correlation heatmap for knowledge level of KVK personnel.

the number of respondents (142), and the maximum score (3), which came out to be 8520.

The knowledge index was then calculated using the following formula:

$$\text{Knowledge Index} = \frac{\text{Total obtained score}}{\text{Maximum possible score}} \times 100$$

$$= \frac{7245}{8520} \times 100 = 85.03\%$$

The index showed that 85.03% of the KVK personnel had knowledge regarding ICT tools.

From the Table 3, correlation analysis results, it was noted that all the selected independent variables were positively correlated with the level of knowledge in ICTs of KVK staff but with varying degrees of correlation. In all the variables used for the research, it was noted that education (r = 0.74674) was very strongly and significantly related with the knowledge level of ICT tools at 1 percent level, followed by experience (r = 0.64688). Correlation heatmap is also shown in Fig. 1. Therefore, from the above findings, it can be seen that education and experience are major factors that determine the level of knowledge about ICTs of KVK staff. Other variables such as scientific orientation (r = 0.55616), achievement motivation (r = 0.54623), age (r = 0.53944), and technological skill (r = 0.53266) were also moderately related with the level of knowledge at 5 percent level. The positive correlation between age and knowledge can be explained through experience, which increases as one ages and becomes exposed to extension-related activities for a long time. In addition, innovativeness, which had a coefficient value of 0.43755, mass media exposure, whose coefficient was 0.42546, and training on ICTs, whose coefficient was 0.33636 also had positive correlations. However, these associations were weaker compared to the other factors considered. The fact that these variables have some impact on knowledge but in relative moderation shows that they are not effective in enhancing knowledge levels. The weak correlation implies that current ICT training programs are not as extensive and practical as expected. From the study, it is clear that sociological, psychological, and communicative factors have an impact on the knowledge level of ICTs among personnel working at KVK.

CONCLUSION

This research suggests that socio-personal and psychological determinants have a considerable impact on the level of ICT knowledge of KVK staff. It should be noted that the data obtained from the survey show that the respondents had a relatively high level of ICT knowledge, but the knowledge level was rather high only regarding mobile phones, smartphones, and WhatsApp, while advanced ICT technologies, such as DSS, GIS, GPS, and remote sensing, were relatively unknown. Moreover, the correlation analysis revealed that education and experience played a pivotal role in predicting ICT knowledge since they had a substantial and statistically significant relationship with the level of ICT knowledge. Scientific orientation, achievement motivation, age, and technological skills had a medium level of impact, while training, mass media communication, and innovativeness had a relatively weak effect.

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