

UTILIZATION PATTERN OF ICT TOOLS AMONG POTATO GROWERS TO FACILITATE APPROPRIATE AGRICULTURAL PRACTICES

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ABSTRACT

In the heartland of Banaskantha, Gujarat, a digital revolution is quietly unfolding as potato growers embrace the transformative power of ICT tools, paving the way for enhanced agricultural practices and a promising future in farming. The study highlights the promising role of Information and Communication Technology (ICT) tools in enhancing agricultural practices for potato growers. The study was purposively conducted in the potato-growing region, comprising 150 respondents. Out of 9 independent variables six were significant. Education and Landholding were significant at a 1% level, where $p=0.002$ and $p=0.005$, respectively. Attitude towards ICT was significant at a 5% level, and Extension participation, Laggard, and Debt were significant at a 10% level. There was no severe multicollinearity issue. Creating a favourable atmosphere for ICT tool acceptance among potato growers can significantly improve agricultural practices. Using ICT technologies in potato farming has enormous promise for sustainable and efficient agricultural practices, resulting in higher yields and improved farmer livelihoods. Most farmers used ICT tools for weather information, Market information, Various Govt. Schemes, Latest Package of Practice and Disease and Pest Management.

Keywords: ICT tools, potato grower, regression, specific need, utilization pattern, VIF.

INTRODUCTION

The agriculture sector is one of the crucial sectors of the country that contributing the GDP. Even at the period of COVID-19 except for agriculture, all of the major economic sectors were severely affected. India's agriculture sector recorded positive growth rate of 3.6% during fiscal year 2020-2021 (PIB, 2022). However, this sector is facing so many challenges due to climate change, degradation of land limited access to information etc. Uttar Pradesh, a state in northern India, supplied about 30 percent of the country's potatoes. West Bengal and Bihar came in second and third, with 26 and 12 percent, respectively. In the most recent season, Gujarat produced about 40 lakh M.T. potatoes compared to India's 530 lakh M.T., or just 8.00% of the overall production. The most potatoes are produced in the Banaskantha district (Directorate of Agriculture, 2022). The production also got hampered due to Covid and lack information about the proper knowledge. ICT (information and communication technology) tools could help farmers have better access to information and knowledge, encourage the use of sustainable farming methods, and increase their production and profitability. ICT (Sinha et al., 2020) has the potential to improve the quality of human existence by

serving as a learning and education medium, as well as a mass communication medium for promoting and campaigning for practical and vital concerns such as health and social issues. The need for ICT in agriculture is to accelerate agricultural growth, to increase the knowledge resource, to facilitate better information access, to improve the efficiency of agricultural processes, and to improve the quality of human life. Understanding ICT Tool Utilization pattern among farmers: Distribution, Content Analysis, Adoption Levels, and Use for Particular Information Need are needed. This research article aims to explore the adoption and utilization pattern of ICT tools (Anand et al., 2022) by farmers for sustainable agriculture practises because it is crucial for achieving sustainable agriculture that farmers adopt and use ICT tools.

OBJECTIVES

To study the association between the selected characteristic of the potato growers and Utilization Pattern of ICT tools by the potato growers.

METHODOLOGY

A mixed-methods research approach was used

for the study to collect data using both quantitative and qualitative methods. A survey questionnaire was given to 150 Potato growers of Banaskantha dist., Gujarat. The study was confined to “ex-post facto” (Simon et al., 2013) The research design was chosen since the independent variables were already present in the study region. The study employed a multistage random sampling technique. Three talukas from the district were randomly selected Dantiwada, Deesa, Lakhani (showed in Fig. 1.). Descriptive statistics and content analysis methods were used to analyse the data. Multiple linear regression (Moiseev, 2017) analysis (Uyanik et al., 2013) was used, which is a statistical method used to simulate the link between a number of independent variables (predictors) and a dependent variable. The Durbin-Watson statistic is a statistical measure used to detect whether autocorrelation exists in the residuals (errors) of a

regression study (Mallick et al., 2023) When the residuals are correlated with each other, it indicates that there is a pattern in the residuals that the model has not captured. The Durbin-Watson statistic has a scale of 0 to 4 (White,1992). VIF (Variance Inflation Factor): VIF is a measure of how much the variance of an estimated regression coefficient rises as a result of model multicollinearity. It quantifies how much the existence of associated predictors inflates the predictor. A high VIF (usually greater than 10) indicates a significant level of multicollinearity, which might affect the model’s results and interpretation (Miles, 2014). The dependent variables that used were Knowledge, Social Participation, Attitude, Debt, Laggard, Education, Landholding, Income, Source of information, Extension Participation and Dependent variable is utilization pattern of ICT Tools.

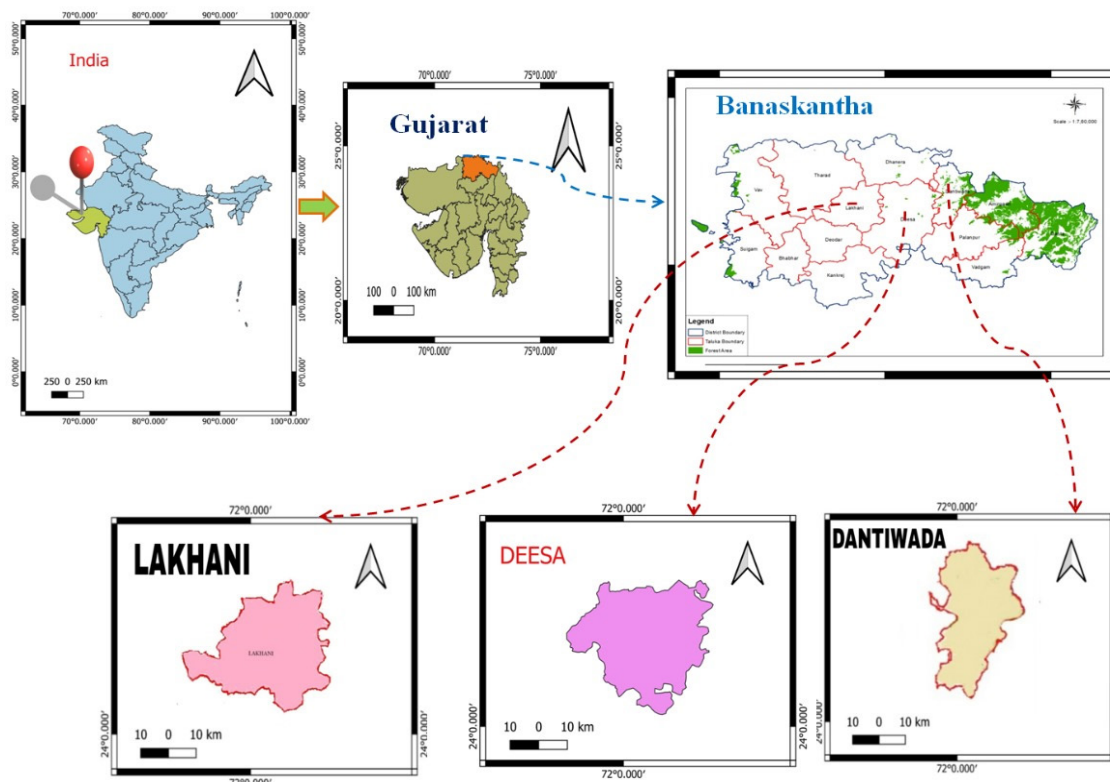


Fig. 1: Study Area of The Research

RESULTS AND DISCUSSION

Understanding ICT Tool utilization pattern Among Farmers: Distribution, Content Analysis, Adoption Levels, and Use for Particular Information Needs are needed. In this study to identify the utilization pattern four factors were included 1) Distribution of respondents according to their Utilization Pattern of ICT tools 2) Extent of utilization of ICT by the farmers 3) Utilization of ICT for specific information needs. The phrase “utilization pattern of ICT tools” indicates the primary goal of the study, which is to look at how farmers

use ICT tools. It implies that the study will look into the gaps in or underutilization of these technologies among farmers as they are currently being used. The phrase “distribution of respondents according to their utilization pattern of ICT tools” emphasises how the respondents will be categorised for the study based on their usage habits. According to this, the study will examine how different farmers embrace and use ICT tools, giving researchers insights into the dispersion and variety of their usage habits. The phrase “content analysis of utilization pattern” means that the study will analyse material

to learn more about how farmers use ICT tools. It suggests that the study will look at the particular ways that farmers use these tools, the kinds of content they access or create, and the motivations behind their use. “Extent of ICT utilization by the farmers”: This component is concerned with quantifying the extent to which farmers use ICT tools. It implies that the study would evaluate how much farmers have integrated ICT into agricultural practises, giving a thorough picture of their general acceptance and usage levels. The phrase “Utilization pattern of ICT for specific information needs” draws attention to a particular focus of the study, which examines how farmers use ICT tools to satisfy their unique information demands. It suggests that the study will look into the kinds of information that farmers look for when using ICT tools, including market prices, weather predictions, crop management strategies, and other pertinent agricultural data.

Table 1: Distribution of respondents according to their utilization pattern of ICT tools (n=150)

Category	Frequency	Percentage
Low (<4.60)	48	32.00
Medium (4.60-27.42)	65	43.33
High (>27.42)	37	24.64
Mean = 16.01; S.D = 11.41		

The fact that most farmers used ICTs on a weekly or biweekly basis is one likely explanation. There was a moderate utilization of ICTs among farmers because they use them when they sense a necessity. There was a lot of use during the initial stage of installation, but this was largely due to the static nature of the material and the farmers’ inability to dedicate much of their time to using ICTs. Mobile phones may be operated without any special training and are inexpensive, versatile devices, therefore their use has been constantly increasing. If the information is current and suited

to their requirements, farmers’ use of ICTs can be enhanced. Furthermore, a lot of farmers claimed that obtaining basic information could be done with a mouse click as opposed to speaking with extension personnel.

a. Independent Variable: (Constant), Knowledge, Social Participation, Attitude, Debt, Laggard, Education, Landholding, Income, Source of information, Extension Participation

b. Dependent Variable: Utilization pattern of ICT tools

The correlation coefficient in this scenario is around 0.854, indicating a significant positive linear link between the independent variables and Utilization Pattern. The R-squared value of around 0.730 indicates that the independent variables explain approximately 73% of the variability in Utilization pattern of ICT tools. An adjusted R-squared (Karch, 2020) value of roughly 0.711 indicates that the independent variables explain approximately 71% of the variability in Utilization pattern of ICT tools. A reduced standard error (Efron et al., 1986) 1.176 in this situation, suggests that the model is better fitting the data. In this situation, the Durbin-Watson statistic (2.154) is employed to determine the presence of autocorrelation in the residuals (error terms). A score of roughly 2 indicates that there is no significant autocorrelation. In summary, the model appears to be an excellent fit for the data, as seen by a high R-squared value (0.730), implying that the predictor variables can explain a considerable part of the variability in the dependent variable (Utilization Pattern of ICT Tools). The Durbin-Watson value of 2.154 indicates that there is no significant autocorrelation in the residuals, showing that the model’s assumptions about error independence are most likely met. Based on the data provided, the predictors stated are critical in explaining Utilization Pattern of ICT Tools.

Table 2: Model Summary of dependent variable i.e., Utilization pattern of ICT tools (n=150)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.854	0.730	0.711	1.176	2.154

Table 3: ANOVA value representing the suitability of regression model (n=150)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	519.732	10	51.973	37.599	.000
2	Residual	192.141	139	1.382		
Total		711.873	149			

a. Independent Variable: (Constant), Knowledge, Social Participation, Attitude, Debt, Laggard, Education, Landholding, Income, Source of information, Extension Participation

b. Dependent Variable: Utilization pattern of ICT tools

ANOVA (Miller,1997) evaluates the overall significance of the regression model (Regression) and the

residual error. The F-statistic in the Regression (Verma et al., 2023) section determines if the model, comprising all predictors, is statistically significant. A significant F-statistic (37.599) with a very low p-value (0.000) indicates that the model is statistically significant and that at least one predictor has a significant effect on Utilization Pattern of ICT Tools. The explained variation owing to the predictors is represented by the Sum of Squares for Regression (519.732). The Residual portion represents the model’s unexplained variance (error) after adjusting for predictors. The entire

variance in the dependent variable (Utilization Pattern of ICT Tools) is given by the entire Sum of Squares (711.873). In conclusion, the ANOVA table aids in comprehending the overall efficacy of the regression model in predicting Utilization Pattern of ICT Tools based on the factors listed. A significant F-statistic indicates that the predictors work together to explain the variability in the dependent variable. The Sum of Squares provides insight into the explained and unexplained variations, which aids in determining model fit and predictive potential.

Table 4: Multivariate regression analysis of independent variables with utilization pattern of ICT tools (n=150)

Model	Unstandardized Coefficients		Standardized Coefficient	t	Sig.	99.0% Confidence Interval for B		Collinearity Statistics	
	B.	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
(Constant)	5.025	1.891		2.658	.009	.087	9.963		
Education	0.192	0.060	0.158	3.181	0.002	0.034	0.350	0.785	1.274
Income	-0.008	0.012	-0.052	-0.664	0.508	-0.039	0.023	0.318	3.146
Extension Participation	0.026	0.014	0.175	1.878	0.062	-0.010	0.063	0.225	4.453
Laggard	-0.097	0.052	-0.091	-1.868	0.064	-0.232	0.039	0.814	1.228
Source of information	-0.031	0.022	-0.123	-1.436	0.153	-0.089	0.026	0.265	3.778
Social Participation	0.535	0.406	0.113	1.318	0.190	-0.525	1.595	0.266	3.757
Landholding	0.169	0.059	0.146	2.884	0.005	0.016	0.322	0.762	1.312
Debt	-0.066	0.041	-0.077	-1.613	0.109	-0.172	0.041	0.848	1.179
Attitude	0.184	0.086	0.100	2.141	0.034	-0.040	0.408	0.887	1.128

a. Dependent Variable: Utilization pattern of ICT tools

Education

Holding other variables equal, a one-unit increase in Education is associated with a 0.192 increase in Utilization Pattern of ICT Tools. Education has a 1% level of significance p-value of 0.002, indicating that it is likely to have an effect on Utilization Pattern of ICT Tools. Higher levels of schooling almost certainly indicate a better understanding and skill with information and communication technology (ICT). People with a higher education may be more likely to use Utilization Pattern of ICT Tools for educational or developmental objectives.

Income

Income has a minor negative effect on Utilization Pattern of ICT Tools, with a one-unit increase in Income resulting in a 0.008 decrease in Utilization Pattern of ICT Tools. Income is not statistically significant as the p-value is greater than the common significance level of 0.05. Higher-income individuals may have more financial means to invest

in ICT infrastructure, gadgets, and services. Because of this financial power, they are able to actively participate in and engage with Utilization Pattern of ICT Tools programmes.

Extension Participation

A unit rise in Extension Participation corresponds to a 0.026 increase in Utilization Pattern of ICT Tools. At the 10% significance level, Extension Participation is not statistically significant, although it is near. Active participation in extension programmes may result in greater awareness and knowledge of Utilization Pattern of ICT Tools activities. Participants in such programmes may acquire an interest in using ICT for a variety of activities that correspond with the goals of Utilization Pattern of ICT Tools.

Laggard

Holding all other variables fixed, being a Laggard is associated with a 0.097 drop in Utilization Pattern of ICT Tools. Laggard is not statistically significant at the 10% significance level, although it is quite close. Individuals who are averse to technological change may lack motivation or

interest in implementing Utilization Pattern of ICT Tools. Their reluctance to embrace new technology may have a detrimental impact on their involvement with Utilization Pattern of ICT Tools.

Source of Information

Utilization Pattern of ICT Tools is negatively affected by the Source of Information, with a one-unit increase resulting in a 0.031 decrease in Utilization Pattern of ICT Tools. The p-value for Source of Information is bigger than the standard significance level of 0.05, hence it is not statistically significant. Individuals' trust and belief in Utilization Pattern of ICT Tools activities may differ depending on the source of information. Individuals may be influenced to engage with Utilization Pattern of ICT Tools by credible and trustworthy sources, but untrustworthy sources may deter them.

Social Participation

A unit rise in Social Participation corresponds to a 0.535 increase in Utilization Pattern of ICT Tools. Social participation is not statistically significant. Active involvement in social events might expose persons to the benefits and positive outcomes linked with Utilization Pattern of ICT Tools. Through social contacts, people may grasp the advantages of utilising ICT and become more likely to engage with Utilization Pattern of ICT Tools programmes.

Landholding

Landholding increases Utilization Pattern of ICT Tools, with a one-unit increase related with a 0.169 increase in Utilization Pattern of ICT Tools. With a p-value of 0.005, landholding is statistically significant at 1% level, indicating that it is likely to have an impact on Utilization Pattern of ICT Tools. Individuals who own more land may have greater economic stability and resources, allowing them to engage in

ICT. They may use ICT for agricultural purposes, increasing their participation with Utilization Pattern of ICT Tools, particularly if it is aimed at agricultural development.

Debt

Debt has a negative impact on Utilization Pattern of ICT Tools, with each unit increase resulting in a 0.066 fall in Utilization Pattern of ICT Tools. Landholding has a statistically significant p-value of 0.005, indicating that it is likely to have an impact on Utilization Pattern of ICT Tools. Individuals with existing debt may prioritise debt repayment over ICT investment, limiting their ability to participate in Utilization Pattern of ICT Tools projects and having a negative impact.

Attitude

Attitude influences Utilization Pattern of ICT Tools positively, with a one-unit increase related with a 0.184 increase in Utilization Pattern of ICT Tools. With a p-value of 0.034, attitude is statistically significant at 10% level, indicating that it is likely to have an impact on Utilization Pattern of ICT Tools. Individuals with a good attitude towards technology and innovation may be more likely to actively interact with Utilization Pattern of ICT Tools. Those who have a positive attitude towards ICT are more likely to participate in and benefit from Utilization Pattern of ICT Tools projects.

Attitude: A one-unit gain in knowledge corresponds to a 0.488 increase in Utilization Pattern of ICT Tools. Attitude has a very statistically significant impact at 5% level. Higher knowledge levels may enable users to use and benefit from Utilization Pattern of ICT Tools successfully. Knowledgeable individuals may recognise the potential of ICT for a variety of objectives, resulting in a significant increase in their interaction with Utilization Pattern of ICT Tools.

Table 4 : Utilization pattern of ICTs for specific information

(n=150)

Sr. No.	Area of information	Always		Sometimes		Never		Mean score	Rank
		f	%	f	%	f	%		
1	Export quality requirement	33	22.00	49	32.66	68	45.33	0.77	IX
2	Latest package of practices	60	40.00	63	42.00	27	18.00	1.22	IV
3	Water management	38	25.33	60	40.00	53	35.33	0.9	VII
4	Disease and pest management	48	32.00	59	39.33	45	30.00	1.02	V
5	Commercial agriculture	30	20.00	54	36.00	66	44.00	0.75	X
6	Post harvest technology and value addition	27	18.00	48	33.00	69	46.00	0.68	XII
7	Market information and price trends	82	54.66	45	30.00	23	15.33	1.4	II
8	Dairy and poultry management	38	25.33	48	32.00	54	36.00	0.82	VIII
9	Facilities of land records	23	15.33	42	28.00	86	57.33	0.58	XIII
10	Crop insurance	29	19.33	49	32.66	72	48.00	0.71	XI
11	Weather information	87	58.00	51	34.00	13	8.66	1.41	I
12	Government schemes and programmes	68	45.33	52	34.66	30	20.00	1.28	III
13	Integrated nutrient management	48	32.00	45	30.00	57	38.00	0.94	VI

f: Frequency, %: Percentage

The data analysis demonstrates varying patterns of utilization among several agricultural information categories. Farmers prioritise and actively employ knowledge on the most recent agricultural practises, as demonstrated by a high utilization pattern and a strong utilization pattern. In contrast, information about quality standards for exports has a lower utilization pattern, indicating that farmers access it less frequently or deem it less important. Understanding these patterns of use might drive targeted initiatives for increasing agricultural information transmission in order to better suit the individual needs of farmers.

Based on the utilization pattern of ICT tools, farmers were classified into three groups: low, medium, and high. This classification offers a nuanced understanding of the varying degrees of ICT adoption among respondents, with 43.33% falling into the medium category. The study on the utilization pattern of ICT tools among farmers produced insightful findings across various dimensions. The observed moderate utilization of ICTs among farmers, particularly in their weekly or biweekly usage, suggests a practical approach tied to perceived necessity. The initial surge in usage during installation highlights a learning curve and the importance of user-friendly interfaces. The preference for mobile phones, attributed to their ease of use and cost-effectiveness, indicates a potential avenue for targeted interventions. The regression analysis (Table 2) demonstrated a strong positive linear relationship ($R = 0.854$) between independent variables and the utilization pattern of ICT tools. The high R-squared (Cameron et al., 1997) value (0.730) implies that the selected predictors (education, income, extension participation, etc.) collectively explain a substantial portion (73%) of the variability in ICT utilization patterns. This reinforces the significance of these factors in influencing farmers' engagement with ICT tools. The ANOVA results (Table 3) underscored the overall significance of the regression model, with a substantial F-statistic (37.599) and a low p-value (0.000), indicating that at least one predictor significantly affects ICT utilization patterns. The model's explanatory power was evident in the Sum of Squares for Regression (519.732), illustrating the variance explained by the predictors. The multivariate regression analysis (Table 4) delved into the impact of individual predictors on ICT utilization patterns. Education emerged as a significant positive influencer, emphasizing the role of knowledge and skill in enhancing ICT engagement. Landholding, attitude, and knowledge also displayed positive associations, underlining the multifaceted nature of factors influencing utilization patterns. Conversely, income and source of information did not exhibit statistical significance, suggesting that financial capacity and information sources may have less direct impact on ICT utilization among farmers. According to the Table 5, the utilization pattern for information connected to the most recent package of agricultural practises is the greatest among the first five specific demands analysed. Farmers place a high value on and use this category, with 60% claiming constant access to this information and another 40% stating access only occasionally. This high utilisation pattern is reflected

in the comparatively high mean score of 1.22, which places the category fourth. In contrast, the least specific necessity, relevant to export quality criteria, has a lower utilisation pattern. Only 33% of farmers say they always have access to this information, while 22% say they have access to it occasionally. The mean score of 0.77 and ninth place indicate that farmers see this information as less readily available.

CONCLUSION

This study looked on farmers' utilization pattern of ICT technologies in agricultural practises. According to the distribution analysis, a substantial proportion of farmers employed ICT tools moderately. The content analysis revealed a wide range of applications, emphasising the importance of targeted interventions. Education, landholding, attitude, and knowledge were identified as influential components in the regression model, with higher education, a positive attitude, and improved knowledge favourably impacting ICT tool utilization. Income and information sources, on the other hand, had no substantial impact. Notably, the study revealed inequalities in utilisation patterns, with farmers placing a high value on the most recent agricultural practises but displaying little interest in information on export quality criteria. Understanding these trends informs focused initiatives for improving agricultural information delivery to meet the individual needs of farmers.

FUTURE SCOPE

The future scope of research on the Utilization Pattern of ICT Tools Among Potato Growers involves exploring advanced technologies for potato cultivation, implementing targeted training programs for growers' digital literacy, assessing long-term impacts, customizing solutions for regional needs, facilitating market access, understanding decision-making processes, evaluating environmental sustainability, fostering collaborative platforms, addressing policy implications, and promoting social and economic empowerment. These avenues aim to continually enhance agricultural practices, productivity, and the overall well-being of potato growers.

ACKNOWLEDGMENT

I extend my heartfelt thanks to Dr. Sudhanand Prasad Lal, Assistant Professor in the Department of Agricultural Extension Education, Post Graduate College of Agriculture (PGCA), Dr. Rajendra Prasad Central Agricultural University, Pusa. His support has been instrumental in shaping the direction of my research and for analyzing my data in new dimension and I am grateful for his expertise and encouragement.

FUNDING

1st author received the funding from Indian Council of Agricultural Research, New Delhi NTS Scholarship via letter no. F. NO. EDN/125/2015-Exam Cell, Dated 08/08/2019. to carry out and complete the research

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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Received : January 2024 : Accepted : April 2024