**Original Research Article**

**A STUDY ON EXTENT OF UTILIZATION OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) AMONG FARMERS IN TIRUPATHUR DISTRICT**

**Abstract**

 The growing complexity of agrarian challenges in India has exceeded the capacity of traditional public extension services, challenging the integration of Information and Communication Technology (ICT) to ground the knowledge gap. This study explores the extent of utilization of ICT tools among farmers in Tirupathur district of Tamil Nadu. A study was conducted across 10 villages using a proportionate random sampling method, with data collected from 120 respondents through a structured interview schedule. Findings indicates that major ICT tools included Television, Mobile phones, Agrisnet, TNAU AGRITECH portal, Paddy expert system, IFFCO Kisan, YouTube and WhatsApp which exhibited high engagement. Conversely, minor tools such as e-agricultural magazines, e-Krishi Kendra, AGMARKNET, Telegram and Twitter showed minimal usage highlighting the need for improved digital literacy and targeted awareness campaigns to enhance the adoption of underutilized ICT tools for effective knowledge dissemination in rural communities. Analyzing 13 personal, socio-economic, cognitive, behavioral, and skill-related factors that revealed farm size, information seeking behaviour, ownership of ICT gadgets, social participation and social media usage exhibit very strong positive correlations with ICT adoption, while occupational status shows a strong negative correlation underscoring the need for targeted interventions to improve digital engagement in agriculture and Education showed a very weak and non-significant relationship with ICT usage, indicating that formal education alone does not significantly influence the extent of ICT utilization among respondents. This study sheds light on the transformative eventuality of ICT in ultramodern extension services and its critical part in strengthening pastoral agrarian knowledge dispersion.

**KEYWORDS**: ICT, Agriculture, Extent of utilization, Farmers, ICT Platforms.

**Introduction**

 Agriculture continues to be the main driver of India's economy and is crucial to both employment creation and food security. The fast expansion of technology has made information and communication technology (ICT) a revolutionary tool for modernizing agricultural practices, boosting output, and ensuring sustainable growth (Sharma, Jha, & Thangjam, 2024). ICT applications in agriculture, which offer real-time access to weather predictions, market pricing, pest control strategies, and best agricultural practices, enhance farmers' ability to make decisions (Patil, Gelb, Maru, Yadaraju, Moni, & Misra, 2008). Farmers' usage of ICT varies widely based on a variety of factors, such as socio-economic status, educational attainment, and digital competency, despite the technology's potential benefits (World Bank, 2023). In places like Tirupathur, where agriculture is a major source of revenue, knowing the degree of ICT use is essential for creating policies that reduce the digital divide (FAO, 2016). This study aims to assess the level of ICT use among farmers in the Tirupathur area while examining the key factors that influence adoption.

 The results will be very helpful to policymakers, agricultural extension agencies, and other stakeholders who are working to empower agriculture through digital means.

**Materials and methods**

**Study Area and Sample Selection**

 The purpose of this study is to evaluate how much farmers in Tamil Nadu's Tirupathur district use information and communication technology (ICT). Ten villages in the Tirupathur block are the subject of the study, these were chosen for their agricultural activities and ease of access to ICT services. To provide varied representation from a range of farm sizes and socioeconomic backgrounds, 120 respondents were chosen using the proportionate random sampling technique.

**Selection of Variables**

 The following factors were chosen to examine their effects on farmer’s use of ICT based on expert assessment and research relevance:

* **Personal and Socio-Economic Variables**: Age, educational status, occupational status, farm size, farming experience, and annual income.
* **Cognitive and Behavioral Variables**: Digital literacy, information-seeking behavior, ownership of ICT gadgets, social participation, innovativeness, and social media usage.
* **Skill and Knowledge Variables**: Training undergone on ICT.

**Data Collection**

 The chosen farmer’s primary data was gathered using a pre-tested interview schedule. The interview approach was chosen because it allowed for direct communication and guaranteed replies that were accurate and clear. Based on the multidimensional approach, questions were formulated.

**Data Processing and Analysis**

 Using the proper statistical methods, the gathered data was scored, tabulated, classified, and examined. Percentage analysis, frequency analysis, correlation, and multiple linear regression were used to evaluate the extent of utilization, enabling comparison of farmer’s extent of use. To determine the main elements impacting the integration of digital technologies in agriculture, relationships between the degree of ICT use and a few chosen variables were also investigated.

**Results and discussion**

**Distribution of respondents according to their Regressor variables**

**Age**

 The distribution of respondents by age revealed that a majority (65%) belonged to the middle-aged group (36-45 years), followed by older respondents (25%) and younger respondents (10%). This indicates that the primary decision-makers in farming activities were predominantly middle-aged individuals, likely contributing to their extensive experience and established practices.

**Educational Status**

 Educational attainment varied significantly, with the highest proportion (29.16%) having higher secondary education, while 24.19% had collegiate education. A notable portion (13.33%) were illiterate. This educational disparity may impact their capacity to adopt modern agricultural technologies and practices.

**Occupational Status**

 The data showed that 78.33% of respondents were engaged in agriculture as their primary occupation, reflecting the region's agrarian economy. The remaining 21.67% considered agriculture as their secondary occupation, possibly supplementing other income sources.

**Farm Size**

 The majority (65%) were small farmers, indicating the prevalence of small-scale farming systems. Marginal farmers constituted 11.66%, while 23.34% were big farmers, underscoring the challenges smaller landholders may face in resource mobilization and sustainability.

**Farming Experience**

 Most respondents had medium (45%) or low (40.83%) experience, while only 14.17% had extensive experience (>20 years). This suggests that a significant portion of the population may still be developing advanced farming skills.

**Digital Literacy**

 Digital literacy was moderate for 37.5% of respondents, while 35% reported low literacy and 27.5% had high literacy. This suggests a need for targeted digital training initiatives to enhance farmers' technological capabilities.

**Annual Income**

 Nearly half (46.66%) had low income, followed by 41.67% in the medium-income category and only 11.67% reporting high income. This income disparity highlights potential financial constraints in adopting advanced agricultural practices.

**Information Seeking Behaviour**

 A significant proportion (45%) exhibited medium information-seeking behavior, while 34.17% showed high engagement. This suggests a positive inclination towards exploring new agricultural methods.

**Ownership of ICT Gadgets**

 Mobile phones/smartphones were the most common ICT gadgets (35.83%), followed by televisions (27.5%). Limited ownership of computers/laptops (6.66%) suggests barriers to accessing advanced digital platforms.

**Social Participation**

 More than half (53.33%) exhibited medium social participation, while 25% had low participation. Enhanced social involvement could potentially improve knowledge exchange and adoption of new technologies.

**Innovativeness**

 Over half (54.16%) preferred adopting technologies after observing successful implementations, while 40% were early adopters. Only 5.84% delayed adoption, indicating a generally receptive attitude towards innovation.

**Social Media Usage**

 Medium social media usage dominated (71.67%), indicating that social platforms are emerging as key information channels for farmers.

**Training on ICT**

 A large proportion (70.83%) had no ICT training, underscoring the need for improved access to digital learning programs.

**Distribution of respondents according to their Regressed variables**

**Utilization of ICT Gadgets**

 Television (62.5%) and mobile phones (41.66%) were the most frequently used gadgets, highlighting their role in information dissemination. In contrast, tools like pendrives (20.83%) and e-agricultural magazines (16.67%) had lower adoption, indicating limited digital literacy.

**Utilization of Agricultural Portals**

 Portals such as **TNAU AGRITECH** (39.16%) and **AGRISNET** (40%) were widely used, while **e-Krishi Kendra** (56.66%) and **AGMARKNET** (63.33%) saw minimal engagement, reflecting awareness gaps.

**Utilization of VKCs and Telephony Services**

 Village Knowledge Centres (VKCs) had moderate usage (25%), while services like the **Farmers Call Centre** had low adoption (49.16% never), emphasizing the need for improved outreach.

**Utilization of Mobile Apps**

 Popular apps like the **Paddy Expert System** (40.83%) and **Uzhavan app** (37.5%) showed strong engagement. Conversely, crop-specific apps such as the **Sugarcane Expert System** (55% never) had low usage, indicating limited awareness.

**Utilization of Social Media**

 **YouTube** (41.67%) and **WhatsApp** (28.33%) were prominent, while platforms like **Twitter** (55.83% rarely) and **Instagram** (42.5% never) saw minimal engagement.

**Key findings**

 The findings highlight that while several socio-economic and behavioral factors correlate with ICT utilization, **social media usage** emerges as the most significant predictor. This emphasizes its crucial role in modern agricultural practices by enhancing information access, knowledge sharing, and technology adoption. Additionally, improving **digital literacy**, encouraging **social participation**, and expanding **ICT training** can further strengthen ICT adoption.

**TABLE 1**

**(*Distribution of respondents according to their Regressor variables*)**

 **(N=120)**

|  |  |  |  |
| --- | --- | --- | --- |
| **S.No** | **Category** | **Number of respondents** | **Per cent** |
| **Distribution of respondents according to their age** |
| 1. | Young (Up to 35 years) | 12 | 10.00 |
| 2. | **Middle (36-45 years)** | **78** | **65.00** |
| 3. | Old (above 45 years) | 30 | 25.00 |
| **Distribution of respondents according to their educational status** |
| 1. | Illiterate | 16 | 13.33 |
| 2. | Primary education | 10 | 8.33 |
| 3. | Middle school education | 16 | 13.33 |
| 4. | Secondary school education | 14 | 11.66 |
| 5. | **Higher secondary school education** | **35** | **29.16** |
| 6. | Collegiate education | 29 | 24.19 |
| **Distribution of respondents according to their occupational status** |
| 1. | **Agriculture as primary occupation** | **94** | **78.33** |
| 2. | Agriculture as secondary occupation | 26 | 21.67 |
| **Distribution of respondents according to their farm size** |
| 1. | Marginal farmers(< 2.5 acres) | 14 | 11.66 |
| 2. | **Small farmers(2.51 to 5 acres)** | **78** | **65.00** |
| 3. | Big farmers(> 5 acres) | 28 | 23.34 |
| **Distribution of respondents according to their farming experience** |
| 1. | Low (<10 years) | 49 | 40.83 |
| 2. | **Medium (10-20 years)** | **54** | **45.00** |
| 3. | High (>20 years) | 17 | 14.17 |
| **Distribution of respondents according to their digital literacy** |
| 1. | Low  | 42 | 35.00 |
| 2. | **Medium**  | **45** | **37.50** |
| 3. | High  | 33 | 27.50 |
| **Distribution of respondents according to their annual income** |
| 1. | **Low** | **56** | **46.66** |
| 2. | Medium | 50 | 41.67 |
| 3. | High | 14 | 11.67 |
| **Distribution of respondents according to their information seeking behaviour** |
| 1. | Low | 25 | 20.83 |
| 2. | **Medium** | **54** | **45.00** |
| 3. | High | 41 | 34.17 |
| **Distribution of respondents according to Ownership of ICT gadgets** |
| 1. | Computer/Laptops | 08 | 6.66 |
| 2. | **Mobilephones/Smartphones** | **43** | **35.83** |
| 3. | Television | 33 | 27.50 |
| 4. | Radio | 25 | 20.83 |
| 5. | Pendrive | 11 | 9.18 |
| **Distribution of respondents according to their social participation** |
| 1. | Low | 30 | 25.00 |
| 2. | **Medium** | **64** | **53.33** |
| 3. | High | 26 | 21.67 |
| **Distribution of respondents according to their innovativeness** |
| 1. | As soon as a new technology is introduced | 48 | 40.00 |
| 2. | **After seeing the farmers have done it successfully** | **65** | **54.16** |
| 3. | I prefer to wait and take my own time | 7 | 5.84 |
| **Distribution of respondents according to their social media usage** |
| 1. | Low | 18 | 15.00 |
| 2. | **Medium** | **86** | **71.67** |
| 3. | High | 16 | 13.33 |
| **Distribution of respondents according to their training undergone on ICT** |
| 1. | **No training** | **85** | **70.83** |
| 2. | Attended one training | 20 | 16.67 |
| 3. | Attended two training or more | 15 | 12.50 |
|  | **Total** | **120** | **100.00** |

**TABLE 2**

**(*Distribution of respondents according to their Regressed variables*)**

 **(N=120)**

|  |
| --- |
| **Distribution of respondents according to their Extent of utilization of ICT gadgets** |
| **S. No** | **Services** | **Frequently** | **Sometimes** | **Rarely** | **Never** |
|  |  | **No** | **%** | **No** | **%** | **No** | **%** | **No** | **%** |
| 1 | Radio |  42 | 35.00 | 45 | 37.50 | 21 | 17.5 | 17 | 14.16 |
| 2 | Television | 75 | **62.50** | 45 | 37.50 | 0 | 0.00 | 0 | 0.00 |
| 3 | Mobile phone | 50 | **41.66** | 41 | 34.16 | 26 | 21.66 | 8 | 6.66 |
| 4 | Pendrive | 25 | 20.83 | 12 | 10.00 | 32 | 26.66 | 32 | 26.66 |
| 5 | e-Agriculturalmagazine | 20 | 16.67 | 18 | 15.00 | 30 | 25.00 | 37 | 30.83 |
| **Distribution of respondents according to their Extent of utilization of Agricultural portals** |
| 1 | TNAU AGRITECH portal | 47 | **39.16** | 31 | 25.83 | 41 | 34.16 | 22 | 18.33 |
| 2 | AGRISNET | 48 | **40.00** | 29 | 24.16 | 21 | 17.50 | 17 | 14.16 |
| 3 | e-Krishi Kendra | 0 | 0.00 | 0 | 0.00 | 48 | 40.00 | 68 | 56.66 |
| 4 | AGMARKNET | 0 | 0.00 | 0 | 0.00 | 39 | 32.50 | 76 | 63.33 |
| 5 | IFFCO Agri portal | 21 | 17.50 | 25 | 20.83 | 32 | 26.66 | 10 | 8.33 |
| **Distribution of respondents according to their Extent of utilization of VKC’s and Telephony**  |
| 1 | Village Knowledge Centres (VKCs) | 30 | **25.00** | 24 | 20.00 | 35 | 29.16 | 27 | 22.5 |
| 2 | Village Resource Centres (VRCs) – | 21 | 17.5 | 25 | 20.83 | 45 | 37.50 | 24 | 20.00 |
| 3 | Farmers Call Centre | 25 | **20.83** | 8 | 6.66 | 27 | 22.50 | 59 | 49.16 |
| 4 | Mobile Advisory Services by KVKs | 27 | 22.5 | 45 | 37.50 | 24 | 20.00 | 22 | 18.33 |
| **Distribution of respondents according to their Extent of utilization of Mobile apps**  |
| 1 | Paddy Expert System (TNAU) | 49 | **40.83** | 32 | 26.67 | 28 | 23.33 | 11 | 9.16 |
| 2 | SugarcaneExpert System Tamil (TNAU) | 0 | 0 | 0 | 0 | 54 | 45.00 | 66 | 55.00 |
| 3. | Banana Expert System Tamil (TNAU) | 0 | 0 | 13 | 10.83 | 47 | 39.17 | 60 | 50.00 |
| 4 | Uzhavan app | 47 | 37.50 | 31 | 25.83 | 23 | 19.17 | 19 | 15.83 |
| 5 | IFFCO Kisan | 45 | **36.67** | 31 | 26.67 | 26 | 21.66 | 18 | 15.00 |
| 6 | KisanSuvidha | 12 | 10.0 | 26 | 21.67 | 32 | 26.67 | 50 | 41.67 |
| 7. | TNAU app | 45 | 37.50 | 34 | 28.33 | 29 | 24.17 | 12 | 10.00 |
| 8. | M-Kisan | 12 | 10.0 | 26 | 21.67 | 51 | 42.50 | 31 | 25.83 |
| 9 | Crop Insurance app | 0 | 0.0 | 13 | 10.83 | 41 | 34.85 | 60 | 50.00 |
| 10 | AgriMarket | 18 | 15.00 | 11 | 9.17 | 40 | 33.33 | 51 | 42.50 |
| **Distribution of respondents according to their Extent of utilization of social media** |
| 1. | Youtube | 50 | **41.67** | 40 | 33.33 | 17 | 14.16 | 13 | 10.83 |
| 2. | Whatsapp | 34 | **28.33** | 40 | 33.33 | 32 | 26.67 | 14 | 11.67 |
| 3. | Telegram | 12 | 10.0 | 28 | 23.33 | 49 | 40.83 | 31 | 25.83 |
| 4. | Facebook | 27 | 22.50 | 44 | 36.67 | 24 | 20.00 | 25 | 20.83 |
| 5. | Twitter | 0 | 0.0 | 0 | 0.0 | 67 | 55.83 | 53 | 41.67 |
| 6. | Instagram | 20 | 16.67 | 11 | 9.17 | 38 | 31.67 | 51 | 42.50 |

**TABLE 3. Correlation of characteristics of the respondents with their extent of utilization of ICT services**

 **(N=120)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **-** | **p-** | **Pearson’s r** | **(R²)** | **Correlation strength** |
| Age | <0.001 | 0.589\*\*\* | 0.347 | Strong |
| Education | 0.191 | -0.120 | 0.014 | Very weak |
| Occupational Status | <0.001 | -0.663\*\*\* | 0.439 | Strong (Negative) |
| **Farm Size** | <0.001 | 0.809\*\*\* | 0.655 | **Very Strong** |
| Farming Experience | <0.001 | 0.746\*\*\* | 0.557 | Strong |
| Digital Literacy | <0.001 | 0.707\*\*\* | 0.500 | Strong |
| Annual Income | <0.001 | 0.727\*\*\* | 0.529 | Strong |
| **Information Seeking Behaviour** | <0.001 | 0.777\*\*\* | 0.604 | **Very Strong** |
| **Ownership of ICT Gadgets** | <0.001 | 0.771\*\*\* | 0.595 | **Very Strong** |
| **Social Participation** | <0.001 | 0.824\*\*\* | 0.679 | **Very Strong** |
| Innovativeness | <0.001 | 0.667\*\*\* | 0.445 | Strong |
| **Social Media Usage** | <0.001 | 0.946\*\*\* | 0.895 | **Very Strong** |
| Training Undergone on ICT | <0.001 | 0.714\*\*\* | 0.510 | Strong |

**\*** (Single asterisk) → **p < 0.05** (Significant)

**\*\*** (Double asterisk) → **p < 0.01** (Moderately significant)

**\*\*\*** (Triple asterisk) → **p < 0.001** (Highly significant)

**TABLE 4. Multiple regression analysis of contribution of characteristics towards their extent of utilization of ICT services**

| Model Fit Measures |
| --- |
|  | **Overall Model Test** |
| **Model** | **R** | **R²** | **Adjusted R²** | **F** | **df1** | **df2** | **p** |
| 1 | 0.958 | 0.919 | 0.909 | 92.1 | 13 | 106 | <.001 |
| Note: Models estimated using sample size of N=120 |

| **TABLE 5. Model Coefficients - EXTENT OF UTILIZATION OF ICT** |
| --- |
| **Predictor** | **Estimate** | **SE** | **t** | **p** | **Stand. Estimate** |
| Intercept | 0.45795 | 0.32573 | 1.4059 | 0.163 |   |
| Age | -0.00621 | 0.00345 | -1.7996 | 0.075 | -0.10577 |
| Education | -0.00905 | 0.02945 | -0.3072 | 0.759 | -0.02748 |
| Occupation status | -0.12622 | 0.12184 | -1.0360 | 0.303 | -0.09245 |
| Farm size | 0.08370 | 0.09054 | 0.9245 | 0.357 | 0.08790 |
| Farming experience | -0.01164 | 0.10817 | -0.1076 | 0.914 | -0.01373 |
| Digital literacy | -0.00332 | 0.07181 | -0.0462 | 0.963 | -0.00468 |
| Annual income | -0.01263 | 0.07441 | -0.1697 | 0.866 | -0.01524 |
| Information seeking behaviour | 0.10566 | 0.06831 | 1.5468 | 0.125 | 0.13704 |
| Ownership of ict gadgets | -0.01043 | 0.06077 | -0.1716 | 0.864 | -0.02023 |
| Social participation | 0.11328 | 0.07742 | 1.4632 | 0.146 | 0.13742 |
| Innovativeness | 0.01689 | 0.08387 | 0.2014 | 0.841 | 0.01755 |
| **Social media usage** | **0.78612** | **0.07953** | **9.8847** | **<.001** | **0.74356** |
| Training undergone on ICT | -0.05517 | 0.10511 | -0.5249 | 0.601 | -0.06888 |

**Conclusion**

 The study enhances the significant role of Information and Communication Technology (ICT) in enhancing agricultural extension services and improving farmer’s knowledge, decision-making, and productivity. The findings reveal that socio-economic variables such as education level, digital literacy, social participation, and information-seeking behaviour significantly influence ICT adoption among farmers. While platforms like YouTube, WhatsApp, and Facebook are widely used for agricultural information, the adoption of advanced digital tools such as e-agricultural magazines, crop insurance apps, and Kisan Suvidha remains limited, highlighting a crucial awareness gap. Key barriers to ICT adoption include limited access to digital gadgets like computers and low participation in ICT training programs. The prevalence of small-scale farming systems and financial constraints further impede farmer’s ability to leverage digital advancements effectively. To address these challenges, targeted interventions such as enhanced ICT training, improved digital infrastructure, and customized information services are essential. Policymakers, extension organizations, and agricultural stakeholders must collaborate to design inclusive and farmer-centric digital solutions that pave way to diverse socio-economic profiles.

 In conclusion, strengthening ICT integration in agriculture is vital for empowering farmers in Tirupathur district to overcome socio-economic challenges, increase productivity, and achieving integrated development and holistic approach.

**Declaration of generative AI and AI-assisted technologies in the writing process**

During the preparation of this work, the author used ChatGPT (developed by OpenAI), Scholarly AI, and Review Management AI in order to assist with formatting references, managing the review process, and improving language clarity. After using these tools, the author reviewed and edited the content as needed and takes full responsibility for the content of the publication.

**COMPETING INTERESTS DISCLAIMER:**

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

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