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Assessment of Wheat Farmers' Knowledge through Kisan Call Centre Advisory Services in Prayagraj, India

Rahul Kumar[1]*, Kumar Sonu[1], Syed H. Mazhar[2], Ajay Verma[1] and Vaibhav Singh[3]

[1]Research Scholar, Department of Extension Education Acharya Narendra Deva University of Agriculture and Technology Kumarganj Ayodhya, Uttar Pradesh, India
[2]Professor, [3]Research Scholar, Department of Agricultural Extension and Communication, Sam Higginbottom University of Agriculture, Technology & Sciences, Prayagraj, Uttar Pradesh India
*Corresponding author email id: gmrahull007@gmail.com

HIGHLIGHTS

- Younger and middle-aged farmers demonstrated significantly higher knowledge levels (χ^2 = 166.66, p<0.01) and better adaptation to ICT-based extension services
- Limited digital literacy, poor connectivity, and inadequate awareness campaigns restrict KCC's full potential in agricultural knowledge transfer
- Findings emphasise the need for targeted digital literacy programs, strengthened awareness campaigns, and farmer-centric service delivery improvements

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ABSTRACT

The study examined the effectiveness of Kisan Call Centre (KCC) as an ICT-enabled extension tool in disseminating improved wheat cultivation knowledge among Prayagraj district's farmers, during 2023-24. A purposive sampling design was employed to select 120 wheat farmers from Chaka block who had utilized KCC services. Data were collected through structured interviews and analysed using descriptive statistics, Chi-square test, and correlation analysis. Results revealed that while 93.49% of farmers were aware of KCC's existence, their knowledge of advanced extension services remained limited. Only 17.88% had a complete understanding of KCC objectives, and awareness about weather advisories (9.94%), conference call facilities (8.13%), and governing agencies (8.13%) was poor. Knowledge distribution showed 50.83% farmers in the medium category, 41.67% in the high category, and 7.50% in the low knowledge category. Chi-square analysis indicated a significant association between age and knowledge levels (χ^2 = 166.66, p<0.01), with younger farmers demonstrating better ICT adoption. Education and occupation showed no significant association with knowledge levels. Correlation analysis revealed strong positive relationships between knowledge and social participation (r=0.827), mass media exposure (r=0.735), and information source diversity (r=0.749). These findings provide crucial insights for extension administrators to develop farmer-centric ICT strategies for effective agricultural extension.

INTRODUCTION

Information and Communication Technology (ICT) has emerged as a revolutionary force in transforming agricultural extension systems globally. Agriculture, the backbone of India's economy employing 62% of the population, faces significant challenges in knowledge dissemination and technology transfer. With

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72.2% of India's population residing in rural areas, effective agricultural extension becomes crucial for sustainable development and food security.

Wheat (*Triticum aestivum*), India's second most important food crop after rice, plays an essential role in ensuring food and nutritional security. Cultivated predominantly during the Rabi season, wheat productivity has improved globally through high-yielding varieties, advanced agronomic practices, and mechanization. However, effective knowledge dissemination remains key to successful adoption, making ICT indispensable in modern agricultural extension.

Uttar Pradesh leads India's wheat production with 9.65 million hectares under cultivation and 26.87 million tonnes output. Despite its dominance in area and production, the state lags behind Punjab and Haryana in productivity due to limited access to technical information, inadequate awareness of modern practices, pest infestations, nutrient deficiencies, and climatic irregularities (Government of Uttar Pradesh, 2023). Prayagraj district faces additional challenges, including *Phalaris minor* infestation, yellow rust disease, and irregular rainfall, which further constrain productivity and reduce profitability for small and marginal farmers.

To bridge this information gap, the Government of India launched the Kisan Call Centre (KCC) scheme on January 21, 2004, under the Ministry of Agriculture and Farmers' Welfare. Operating through a toll-free number (1800-180-1551), KCC functions as an ICT-based extension platform providing timely, accurate, and location-specific agricultural advice from 6:00 AM to 10:00 PM daily (DAC & FW, 2022).

The KCC operates on a three-tier system: Level I queries are handled by Farm Tele-Advisors (FTAs) - agricultural graduates fluent in local languages; unresolved queries escalate to Level II, managed by Subject Matter Specialists (SMSs) from agricultural universities; and complex issues reach Level III, where senior experts provide specialized guidance. The system is supported by the Kisan Knowledge Management System (KKMS), ensuring consistency in advisory services. The Kanpur-based centre serves Uttar Pradesh farmers, including Prayagraj district, offering advice on varietal selection, nutrient management, pest control, irrigation scheduling, and government schemes in Hindi, reducing language barriers.

Despite its potential, awareness and adoption remain limited due to poor connectivity, digital illiteracy, and farmers' reliance on informal information sources (Raina et al., 2011; Nain et al., 2015; Rathore & Sharma, 2020). While studies confirm KCC's effectiveness in knowledge dissemination, underutilization prevents realization of full potential. Query pattern analysis suggests that optimizing handling and categorization could enhance efficiency, enabling extension agencies to address seasonal and crop-specific needs more effectively (Sharma et al., 2021; Godara et al., 2024).

Against this backdrop, the present research paper aimed to evaluate wheat farmers' knowledge levels regarding improved cultivation practices through KCC services in Prayagraj district. The study focused on identifying knowledge gaps, assessing awareness levels, and exploring opportunities for strengthening ICT-enabled agricultural extension. Findings are expected to provide valuable insights for policymakers and extension agencies in improving service delivery and bridging the knowledge divide in rural India.

METHODOLOGY

The present study adopted an ex-post-facto research design to evaluate the knowledge level of wheat farmers regarding the Kisan Call Centre (KCC) services in Prayagraj district, Uttar Pradesh. This design was deemed appropriate as the events and conditions under investigation had already taken place and could not be influenced or altered experimentally. The research was carried out during 2023–24 in Prayagraj district, which was purposively selected owing to its extensive wheat cultivation area covering approximately 2.85 lakh hectares, better accessibility for fieldwork, diversity in farming communities, and the researcher's familiarity with the local socio-cultural setting. A multi-stage sampling approach was utilized for the study. At the first stage, Chaka block was chosen purposively from a total of 23 blocks based on its relatively higher concentration of KCC users and improved adoption of information and communication technologies. In the second stage, eight villages were selected randomly using random number tables. At the final stage, 120 wheat farmers were selected through proportional allocation. To be included, farmers were required to have been cultivating wheat for at least three years, to have availed KCC services a minimum of two times in the past two years, and to express willingness to participate. A pre-tested structured interview schedule was employed for data collection. It consisted of three sections: (i) personal and socio-economic characteristics, including age, education, occupation, landholding, income, social participation, and media exposure; (ii) a 15-item knowledge scale with three response categories (fully correct = 3, partially correct = 2, incorrect = 1); and (iii) information on KCC utilization patterns such as frequency of use, types of queries raised, and satisfaction level. The data were collected through face-to-face interviews conducted in the local Hindi dialect at the farmers' residences. Each interview lasted between 45 and 60 minutes, and the researcher personally administered all interviews to ensure accuracy and uniformity in data collection. A knowledge index was calculated as.

$$\text{Knowledge index} = \frac{\text{Total achievable score - Total score achieved}}{\text{Total achievable score}} \times 100$$

Data analysis was performed using SPSS V.27. Descriptive statistical tools such as frequency, percentage, mean, and standard deviation were used to summarize the findings, while inferential statistics including chi-square tests were applied to examine associations, and Pearson's correlation coefficient was used to assess relationships between variables. Statistical significance was considered at both 0.01 and 0.05 levels of probability.

RESULTS

The Table 1 revealed that an overwhelming majority of respondents (93.49%) possessed awareness about KCC existence, indicating high levels of basic recognition. However, specific knowledge aspects exhibited significant variations. While 52.84% of farmers demonstrated correct knowledge about KCC's contact number, a substantial proportion (43.91%) remained unaware, and a small percentage (3.25%) provided incorrect information. Regarding service offerings, 47.15% of respondents understood the multiple communication modes available through telephone/mobile

Table 1. Distribution of respondents based on knowledge about Kisan Call Centre

Statements	Fully Correct (%)	Partially Correct (%)	Not Correct (%)	KI
Awareness about KCC existence	93.49	6.51	0.00	96.74
KCC contact number	52.84	43.91	3.25	74.79
Multiple communication modes	47.15	48.78	4.07	71.54
KCC objectives	17.88	73.17	8.95	54.46
Operating hours (6 AM-10 PM)	34.96	57.72	7.32	63.82
Holiday services	45.53	47.97	6.50	69.51
Regional language support	95.90	4.06	0.00	97.93
SMS services	69.10	20.33	10.57	79.79
Conference call facility	8.13	67.48	24.39	41.87
Governing agency awareness	8.13	26.83	65.04	21.545
Weather information services	9.94	39.01	51.05	29.44
Special facilities	8.95	17.07	73.98	17.485
Service utilization	89.43	10.57	0.00	94.71
Service charges	83.73	13.00	3.25	90.23
Problem-solving capability	10.57	17.07	72.36	19.10

devices, while 48.78% lacked this knowledge. When examining KCC objectives, only 17.88% demonstrated complete understanding, whereas the majority (73.17%) possessed partial knowledge. Awareness about operating hours (6:00 AM to 10:00 PM) was moderate, with 34.96% of respondents being fully aware. Table 1 showed that 45.53% of farmers knew about holiday services, though 47.97% were partially aware. An impressive 95.90% were aware of regional language support, demonstrating effective localisation. However, awareness about advanced features remained limited: SMS services (69.10%), conference calls (8.13% fully correct), and weather information services (9.94% fully correct). Awareness of governing agencies was particularly poor, with only 8.13% correctly identifying the agency and 65.04% being completely unaware. Knowledge about special facilities remained limited (73.98% unaware). Despite knowledge gaps, service utilization was high (89.43%), and 83.73% were aware of service charges. Only 10.57% believed KCC solved all agricultural problems, while 72.36% felt it did not address all issues comprehensively.

Table 2 demonstrated varying degrees of association between selected socio-personal variables and farmers' knowledge levels. The association between education and knowledge was statistically non-significant ($\chi^2 = 10.07$, $p = 0.259$), indicating that formal education did not significantly influence KCC knowledge among farmers. This suggested that awareness depended more on extension exposure than formal schooling. A highly significant association was found between age and knowledge ($\chi^2 = 166.66$, $p < 0.01$), implying that age considerably influenced farmers' knowledge levels. Younger and middle-aged farmers possessed higher knowledge compared to older farmers, attributed to their greater adaptability and better access to communication technologies. The association between occupation and knowledge was statistically non-significant ($\chi^2 = 6.72$, $p = 0.151$), showing that occupation did not determine knowledge levels. Farmers engaged in cultivation and those involved in allied occupations had similar knowledge levels regarding KCC services.

Table 2. Association analysis between socio-personal variables and knowledge levels

Variables	Chi-square Value	p-value	df	Significance
Education	10.073	0.260	8	Non-significant
Age	166.669	<0.001	6	Highly significant
Occupation	6.723	0.151	4	Non-significant

The correlation analysis revealed significant relationships between respondents' profiles and their KCC knowledge in Table 3. Strong positive correlations emerged between knowledge and social participation (r=0.827), mass media exposure (r=0.735), and information source diversity (r=0.749). Age showed a positive correlation (r=0.745), while annual income and education demonstrated moderate positive correlations. Interestingly, landholding and occupation showed no significant relationships with knowledge, indicating that KCC knowledge was more influenced by socio-demographic and informational factors rather than economic variables. The findings emphasized the critical role of social networks and multi-channel information access in ICT extension adoption among farmers.

Table 3. Correlation analysis between respondent profile and KCC knowledge

Variables	Correlation Coefficient (r)
Age	0.745**
Social participation	0.827**
Mass media exposure	0.735**
Information sources	0.749**
Annual income	0.244*
Education	0.178*
Landholding	0.015
Occupation	0.018

Significant at 0.01(*) and 0.05(*) levels; NS = non-significant

The regression analysis identified two significant predictors of farmers' KCC knowledge shown in Figure 1. Age emerged as the strongest positive predictor ($\beta = 0.251$, $p < 0.001$), indicating that older farmers possessed significantly higher knowledge levels about KCC services. Conversely, Progressiveness demonstrated a negative relationship ($\beta = -0.160$, $p < 0.05$), suggesting that more progressive farmers had lower KCC knowledge levels. This counterintuitive finding implied that progressive farmers might rely on alternative

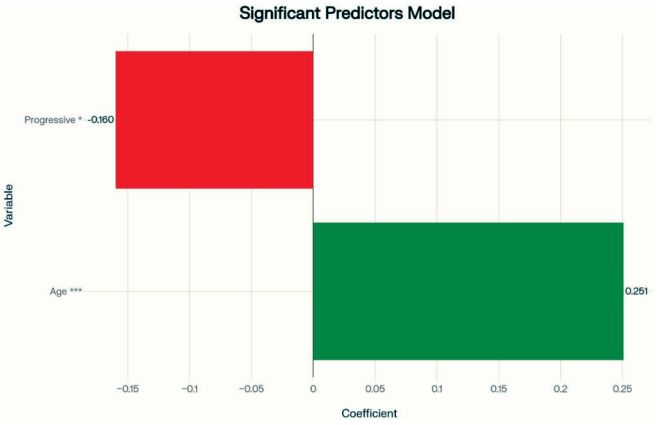

Figure 1. The regression predictors Model of KCC knowledge

information sources rather than traditional extension services. Age proved to be the most influential factor, with each unit increase associated with a 0.251 unit increase in knowledge scores, highlighting the complex relationship between farmer characteristics and ICT-based extension service adoption patterns.

DISCUSSION

The high level of basic awareness (93.49%) about KCC existence indicates successful initial outreach efforts by agricultural extension agencies, though this awareness does not necessarily translate into comprehensive utilization of services. This phenomenon aligns with observations from Monikha et al. (2021) who studied the effectiveness of different extension tools among paddy farmers and found that while farmers showed high awareness of ICT-based extension services, their knowledge about advanced features remained limited. The substantial variation in specific knowledge aspects, particularly the low awareness about KCC objectives (17.88% fully correct), reflects common challenges in ICT-based extension systems. The partial knowledge phenomenon, where 73.17% of respondents possessed an incomplete understanding of KCC objectives, suggests what researchers have termed surface-level adoption in digital extension platforms. This indicates that while farmers are willing to engage with ICT services, deeper understanding requires more intensive extension efforts (Aker, 2011). The impressive awareness about regional language support (95.90%) demonstrates the success of localization strategies, highlighting the critical importance of linguistic accessibility in ICT-based agricultural extension services. Godara et al., (2024) Calls are categorised based on crops and query type, providing a sense of the major crop-based Challenges to underscore data-driven insights in enhancing agricultural support systems. The district-wise breakdown has highlighted farmers' diverse challenges, emphasizing the need for localized, region-specific interventions. Further insights from cropwise data reveal the array of crops (Godara et al., 2024).

The pronounced knowledge gaps regarding advanced features such as conference call facilities (8.13% fully aware) and weather information services (9.94% fully aware) highlight significant underutilization of KCC's full potential. This finding is consistent with broader patterns observed in agricultural technology adoption, where farmers tend to use only basic functions of digital platforms, missing opportunities for more sophisticated advisory services. The poor awareness about governing agencies (65.04% completely unaware) reflects institutional disconnect, indicating need for better integration between technology platforms and institutional awareness campaigns (Sulaiman & Sadamate, 2000). The knowledge distribution analysis revealing that 92.69% of farmers possessed medium to high knowledge levels suggests a reasonably informed user base, which contradicts common assumptions about limited rural digital literacy. This finding supports arguments for recognizing farmers' adaptive capacity in technology adoption. However, the 7.31% in the low knowledge category represents a vulnerable group requiring targeted interventions, emphasizing the need for inclusive extension strategies that address diverse knowledge levels within farming communities (Slathia et al., 2011; Babu et al., 2012).

The highly significant association between age and knowledge levels ($\chi^2 = 166.66$, $p < 0.01$) confirms the pronounced digital divide across age groups, consistent with findings from Silva (2023) who observed that younger farmers in Sri Lankan agricultural extension networks demonstrated better technology adoption capabilities. This age-technology divide necessitates differentiated extension approaches, with younger farmers serving as potential change agents while older farmers require additional support for technology adoption. The non-significant association between formal education and KCC knowledge challenges conventional assumptions about education's role in technology adoption, supporting findings from Singh et al. (2019) who demonstrated that experiential learning through extension exposure may be more critical determinants than formal educational qualifications. The strong positive correlations between knowledge and social participation (r=0.827), mass media exposure (r=0.735), and information source diversity (r=0.749) underscore the importance of multi-channel communication strategies in agricultural extension. These findings validate the significance of social learning networks in technology adoption, where farmers learn through peer interactions and multiple information channels (Bandura, 2001 and Sonu & Jha, 2025). Silva (2023) similarly emphasized that social networks play crucial roles in accelerating agricultural technology adoption, particularly through contact farmer approaches that bridge extension officers and farming communities. The importance of social participation suggests that community-based extension approaches can enhance individual technology adoption, while mass media exposure indicates the complementary role of traditional and digital media in agricultural knowledge dissemination. The effectiveness of integrated extension approaches that combine traditional methods with ICT platforms for optimal knowledge transfer (Monikha et al., 2021). The absence of significant correlations between knowledge and economic variables (landholding, occupation) suggests that KCC's effectiveness transcends economic stratification, supporting arguments for ICT-based extension as potentially equalizing force in agricultural development. This democratizing potential indicates that small and marginal farmers can access the same quality of technical information as larger farmers, provided they have adequate awareness and digital literacy support.

These findings have important implications for extension policy and practice. The results suggest need for age-specific

extension strategies, enhanced awareness campaigns about advanced KCC features, and integration of social learning approaches with digital extension platforms. Furthermore, the importance of multi-channel communication indicates that ICT-based services should complement rather than replace traditional extension methods, creating comprehensive extension systems that leverage both digital and interpersonal communication channels.

CONCLUSION

The study shows that Kisan Call Centre (KCC) has achieved moderate success in improving wheat farmers' knowledge in Prayagraj. Awareness is high (93.49%), but major gaps persist in advanced features, weather advisories, and institutional aspects. Younger farmers adopt technology more easily than older ones, indicating the need for targeted support. Education had little effect, while social participation, extension exposure, and mass media access strongly influenced ICT use. The study recommends digital literacy for older and marginalized farmers, wider promotion through multiple media and local networks, improved connectivity and advisory quality, and region-specific content to strengthen KCC's effectiveness.

DECLARATIONS

Ethical Approval and Consent to Participate: Our study did not require ethical approval; however, the informed consenst of the participants was sought.

Consent of Publication: Participants provided consent for publication

Availability of supporting data: Supporting data are available upon request.

Competing interests/Author contributions: No competing interests were declared. Conceptualization of research (RK, SHM); Designing of the experiments (RK, SHM); Contribution of experimental materials (RK, SHM); Execution of field survey and data collection (RK, AV, VS); Analysis of data and interpretation (KS); Preparation of manuscript (KS).

Conflict of interest: No conflicts of interest among the authors

The authors declare that during the preparation of this work, thoroughly reviewed, revised, and edited the content as needed. The authors take full responsibility for the final content of this publication.

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