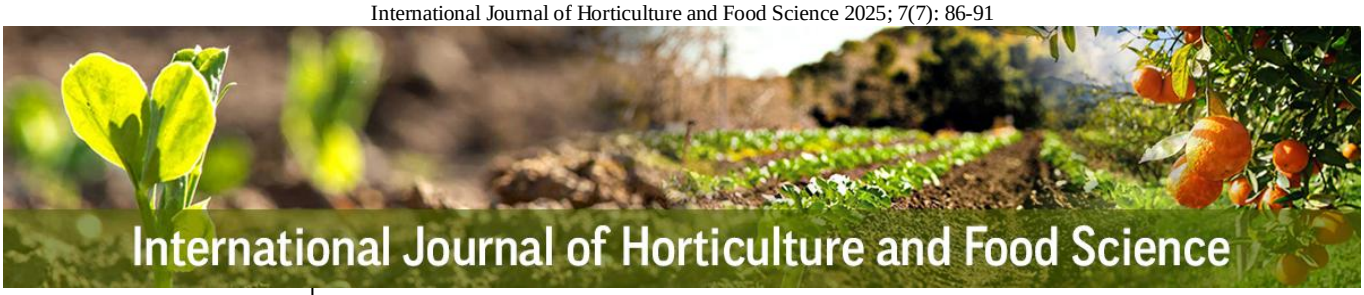

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Understanding mass media and digital literacy among agrochemical retailers and farmers in Bangalore zone

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Abstract
This study investigates the awareness and effectiveness of mass media and digital communication tools among agrochemical retailers and farmers in the Bangalore zone. Surveys were conducted among 200 retailers and 700 farmers across various districts to assess their usage of mobile apps, helpline services, and media platforms in agrochemical marketing and advisory contexts. The findings reveal high smartphone usage (89%) and significant awareness of incoming call and SMS-based services. Retailers and farmers show varying preferences for mobile applications, with the "N" app being the most widely adopted. Television advertisement effectiveness also varied by company, with DuPont and Rallis leading in regional visibility. The study underscores the importance of targeted digital strategies and improved outreach to enhance communication efficacy in the agrochemical sector.

Keywords: ICT tools, agrochemical communication, digital literacy, farmers, mobile apps, Bangalore zone, retailer awareness, television advertising

Introduction
The agrochemical industry is on the significant transformation, driven by the pressing need to protect crop yields and quality in the face of mounting pest infestations, unpredictable climatic conditions, and limited arable land. As the fourth-largest producer and thirteenth-largest exporter of agrochemicals globally, India is strategically positioned to capitalize on its strengths in agricultural production, including its prominent position in the production of spices, pulses, tea, and other crops [1]. The industry's growth trajectory is further bolstered by government initiatives, including increased budgetary allocations for rural development, emphasis on food security, and promotion of modern agricultural practices [2]. The Indian agrochemical market is characterized by a diverse range of products, including insecticides, fungicides, herbicides, and biopesticides, each catering to specific crop protection needs. Insecticides dominate the market, particularly due to the tropical climatic conditions and high production of crops like paddy, cotton, and sugarcane [3]. However, herbicides are currently the fastest-growing segment, driven by labor shortages and increasing labor costs. Fungicides are also witnessing significant demand, particularly in horticulture and floriculture, where the shift towards cultivating fruits and vegetables is gaining momentum [4]. Despite the industry's growth potential, several challenges persist, including high research and development costs, environmental concerns, and competition from genetically modified seeds. Moreover, the industry faces issues related to inefficient distribution channels, counterfeit products, and lack of awareness among farmers about the effective use of agrochemicals. To overcome these challenges, companies are adopting innovative marketing strategies, including rural marketing approaches tailored to the needs and behaviors of farmers. Effective communication plays a critical role in influencing farmers' decisions and behaviors, and companies are leveraging various communication tools, including multimedia platforms, digital media, and interpersonal communication channels [5].
The use of mobile applications, social media platforms, and other digital tools is becoming increasingly important in reaching farmers and promoting agrochemical products. However, the effectiveness of these communication tools in impacting farmers' purchase behavior and loyalty remains a key area of focus for the industry [6].
In this context, the objective of this study is to analyze the communication tools adopted by Agri-Input Industries, understand farmers' preferences for various communication

channels, compare the effectiveness of Agri Input companies' communication tools with those of competitors, and assess the performance of Agri Input companies' digital platforms in relation to other agricultural applications. By examining these aspects, the study aims to provide insights into the Indian agrochemical industry's growth prospects, challenges, and opportunities, and inform strategies for companies to enhance their market presence and impact.

Random Survey

Farmer Survey

A random survey was conducted in 2023-2024 among 700 farmers from the districts of Dharmapuri, Krishnagiri, mandya and chamrajnagar in the Bangalore zone to identify effective agro-input communication tools. Field observations during promotional activities supported the survey findings. The responses were analyzed using the Likert's scale for the perception analysis as it is a qualitative study [7].

Retailer Survey

A random survey was conducted in 2023-2024 among 200 retailers from the districts of Dharmapuri, Krishnagiri, mandya and chamrajnagar in the Bangalore zone to identify effective agro-input communication tools. Field observations during promotional activities supported the survey findings [8]. The responses were analyzed using the Likert's scale for the perception analysis as it is a qualitative study. The survey questionnaires were developed to understand the purchasing preferences of retailers and farmers for agrochemicals. They gathered information on the age and educational background of both groups, the landholding size and farming experience of farmers, the types of crops grown, awareness of helpline services for both retailers and farmers, the performance and usage of mobile applications, and the frequency of agrochemical advertisements broadcasted on television [9].

Scale Used to measure

Likert scale is a psychometric scale that asks respondents to indicate their level of agreement or satisfaction with a statement or question. It typically consists of a series of statements or questions, and respondents are asked to rate their response on a scale, usually ranging from 1 to 5.

A 5-point Likert scale might look like this

- 1 = Strongly Disagree
- 2 = Somewhat Disagree
- 3 = Neutral
- 4 = Somewhat Agree
- 5 = Strongly Agree (10)

Result

Retailer survey

A comprehensive survey was conducted among 200 agrochemical retailers across various taluks in the Bengaluru zone of Karnataka. The highest participation was recorded in Malavalli (20%), followed by Periapatna and Chamarajanagar (18% each). Mandya, Maddur, and Srirangapatna contributed 13%, 11%, and 10% respectively, while Nagamangala (8%) and Pandavapura (1%) had the lowest representation. This indicates that the concentration of agrochemical retailers was highest in Malavalli, Periapatna, and Chamarajanagar taluks.

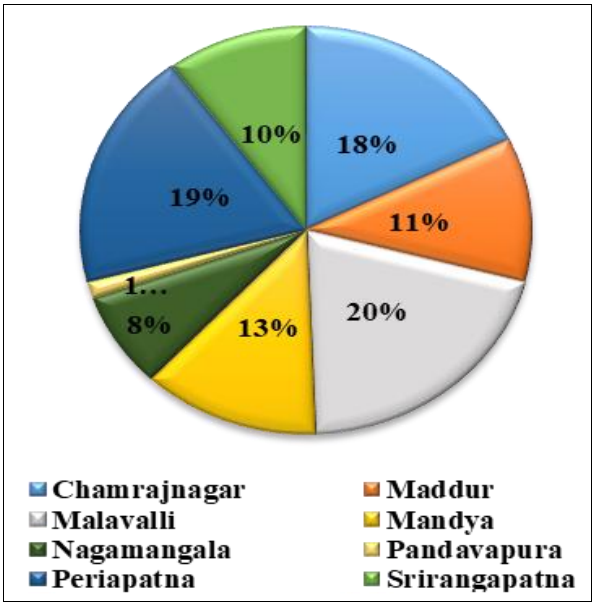

Fig 1: Age and Education of the Retailers

Age and Education of the Retailers

The demographic analysis of retailers showed that 87% had college-level education, 12% had school-level education, and only 1% were illiterate. Age-wise, 62% were between 26-40 years, 34% were 41-60 years old, and a minimal number were either under 25 (1%) or over 60 (3%). This reflects that the agrochemical retail sector is dominated by young to middle-aged individuals with strong educational qualifications.

Farmer's survey in Bangalore zone

The farmer survey, conducted across the same region, showed the highest response from Chamarajanagar and Periapatna (18% each), followed by Malavalli (15%), Mandya, Nagamangala, and Maddur (14% each). Srirangapatna and Pandavapura had the least farmer participation at 6% and 1% respectively. This distribution indicates a well-spread participation, with a focus on Chamarajanagar and Periapatna

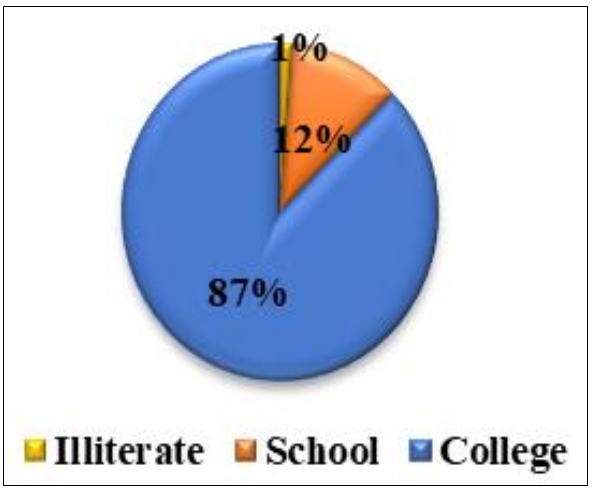

Fig 2: Retailers-Age Distribution

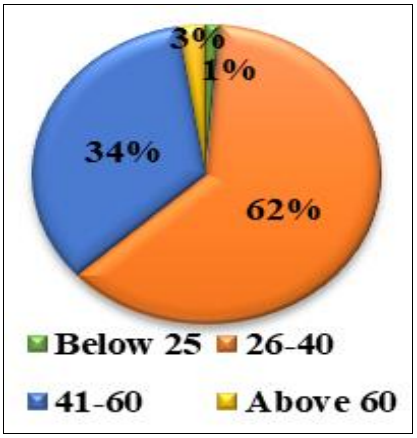

Fig 3: Age and Education Qualification of Farmers

Age and education qualification of farmers

In the Bengaluru zone of Karnataka, the majority of farmers interviewed were educated at the school level, accounting for 66%, followed by 27% with college-level education, while 7% were illiterate. Regarding age distribution, most respondents were between 26 to 40 years old (63%), followed by 28% in the 41 to 60 age group. Only a small proportion were aged above 60 years (8%) and 25 years or below (1%). This indicates that agrochemical usage in the Bengaluru zone is predominantly managed by middle-aged farmers with a basic to moderate educational background.

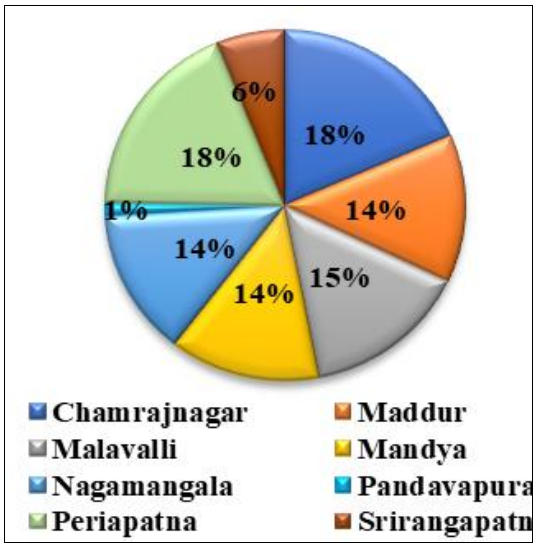

Fig 4: Farmer Education Levels

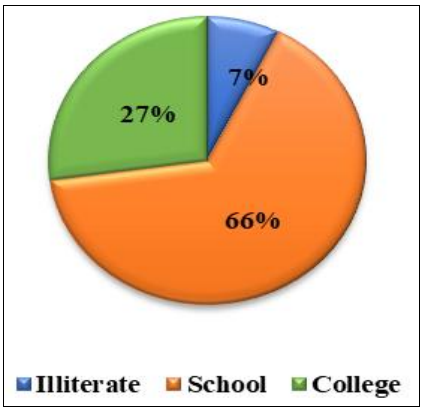

Fig 5: Farmer Age Distribution

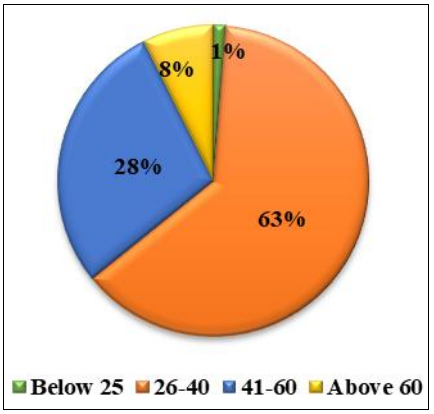

Fig 6: Land Holding Size of Farmers

Land Holding Size of farmer

Landholding patterns revealed that 42% of farmers were medium-scale holders, followed by large-scale (36%) and small-scale (22%) landholders. This indicates a dominance of medium and large landowners in agrochemical usage within the region.

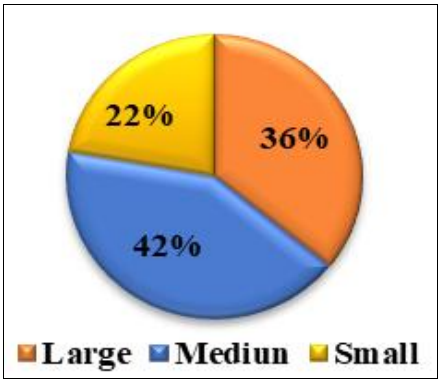

Fig 7: Farming Experience and Crop Sown

Farming experience and crop sown by farmers

Farming experience among the respondents was highest in the 11-20 years range (48%), followed by those with 6-10 years (26%), above 20 years (22%), and below 5 years (4%). Crop cultivation patterns showed that vegetables were the most commonly grown (51%), followed by grains (30%), fruits (17%), and flowers (2%), indicating a preference for high-value vegetable crops..

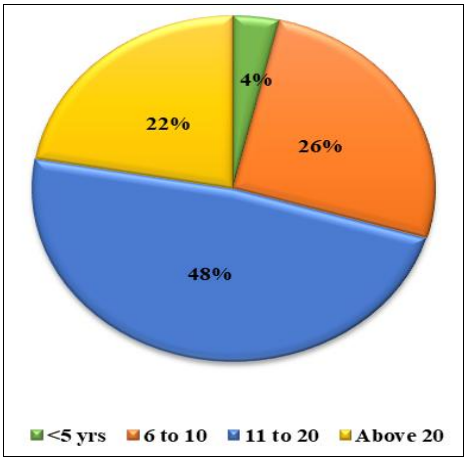

Fig 8: Crop Cultivation Patterns

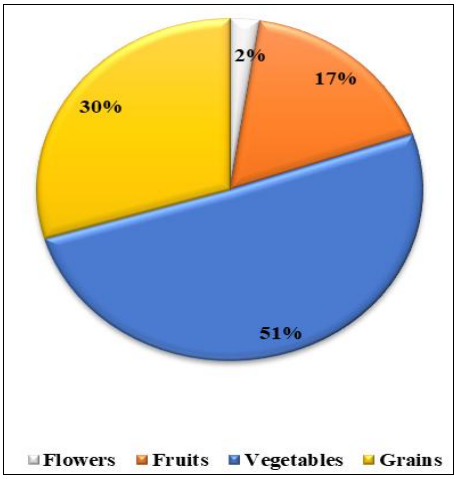

Fig 9: Retailers – Helpline Awareness

ICT TOOLS communication for purchasing Agro chemical

Retailer Helpline-Awareness

In the Bengaluru zone of Karnataka, the awareness among agrochemical retailers regarding helpline communication services offered by chemical companies was notably high. A majority of retailers were aware of incoming call services, with 195 respondents indicating awareness and only 5 unaware. Similarly, 185 retailers were aware of regular SMS services, while just 15 were not. Voice SMS services also had significant reach, with 157 respondents aware and 43 unaware. For outgoing calls, 125 retailers reported awareness compared to 75 who were not. These findings suggest that most agrochemical retailers in the region are well-informed about helpline communication options, especially incoming calls and SMS services, which are the most recognized modes of communication.

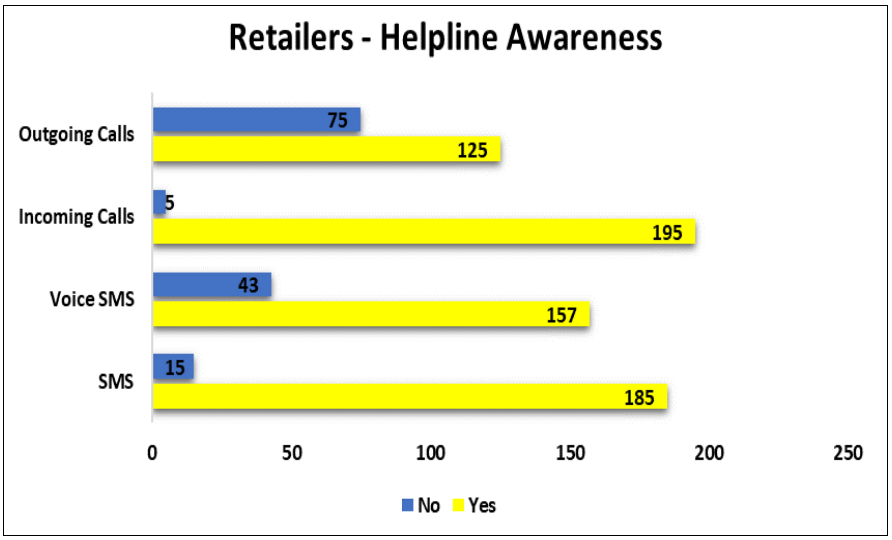

Fig 10: Farmers – Helpline Awareness

Farmer's-Helpline Awareness

Similarly, farmers exhibited high awareness of helpline services. A total of 638 were aware of incoming calls, 546 knew about SMS, 543 were familiar with voice SMS, and 456 knew about outgoing calls. However, a notable number of farmers were still unaware of outgoing calls (244), voice SMS (157), SMS (154), and incoming calls (62), indicating room for further outreach. Smartphone usage was widespread, with 89% of respondents using smartphones, enabling greater access to mobile apps and digital services. This high adoption supports the integration of digital communication in agrochemical marketing and advisory services.

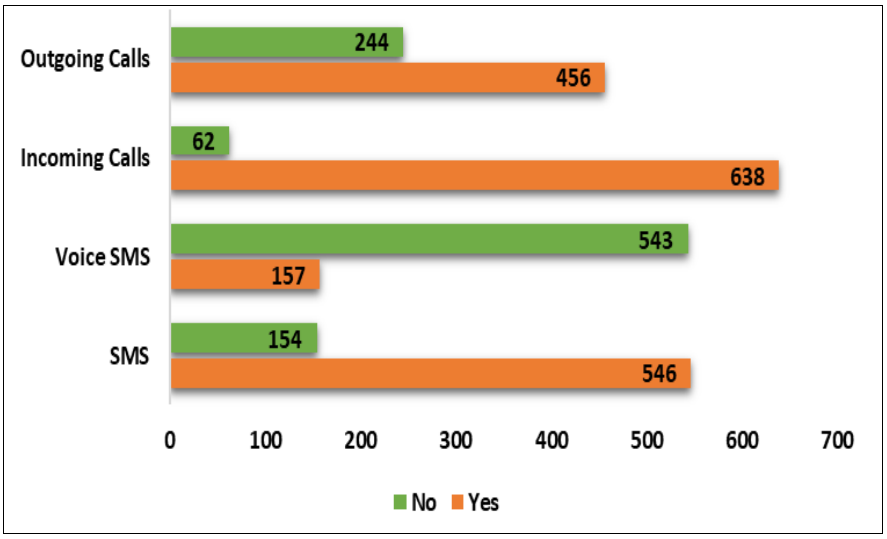

Fig 11: Smartphone usage among respondents

Performance of Mobile App

The surveying area result showed the use of smartphones among farmers and agrochemical retailers was found to be significantly high. As illustrated in the survey, 89% of the respondents reported using smartphones, while only 11% did not. This high rate of smartphone adoption indicates a strong potential for digital communication, mobile applications, and helpline-based services in the agrochemical sector. It reflects a growing trend of technology integration in agriculture, enabling both farmers and retailers to access timely information, product updates, and advisory services through their smart devices. Similarly, the adoption of agrochemical application software varied widely among users. The "N" application was the most widely used, with 54% of respondents favoring it, establishing its strong presence in the market. The RKS app followed with 13% usage, while 7% of users reported using apps classified as "others". The Adama Reach app accounted for 4% of users. Additionally, two apps had 2% usage each, and two others were used by 6% and 8% of respondents, respectively. This pattern indicates a clear dominance of the "N" application, while the remaining apps had comparatively limited uptake.

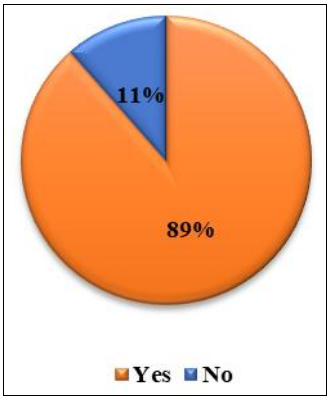

Fig 12: Smartphone users

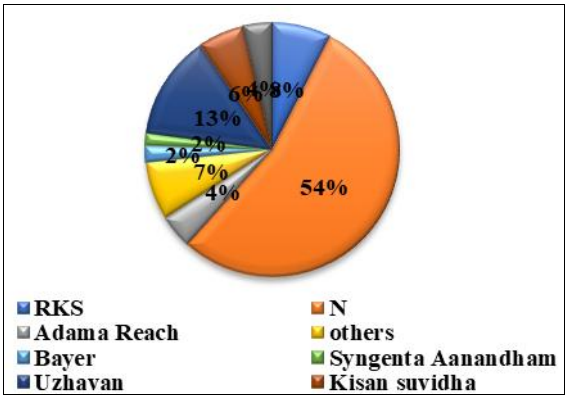

Fig 13: Application software users

Frequency of issuing TV Advertisements

The survey revealed variations in the effectiveness of TV advertisements for different agrochemical companies in Bangalore zone. DuPont had the highest visibility with a score of 3.2 in the Karnataka region, followed by UPL (2.28) and Bayer (2.26). In contrast, Rallis and Syngenta had comparatively lower visibility scores of 1.35 and 1.51, respectively. Interestingly, in the Bengaluru-specific data, Rallis slightly outperformed others with a score of 1.55, while DuPont also maintained a strong presence (1.68). UPL and Syngenta were tied at 1.51, and Bayer had the least impact in this zone with a score of 1.31. This indicates that while DuPont dominates the Karnataka region overall, Rallis holds a slight edge in television advertisement effectiveness within the Bengaluru zone.

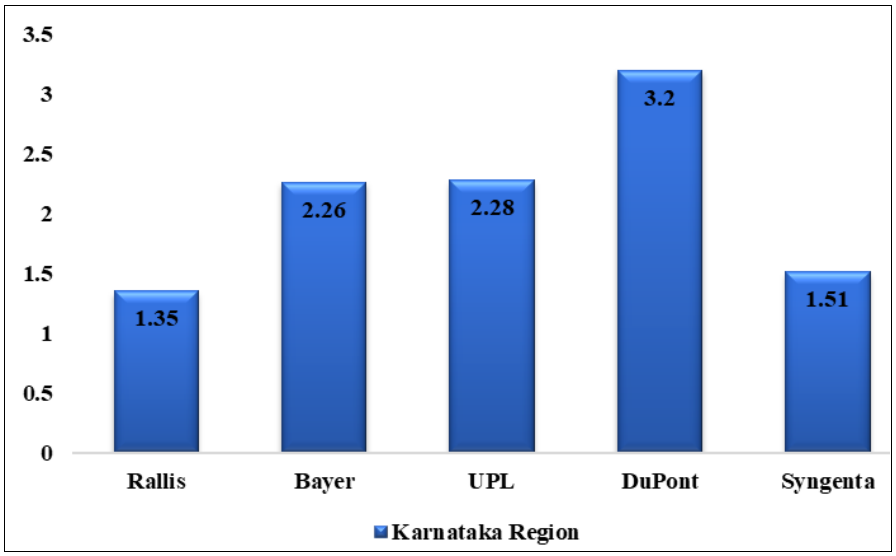

Fig 14: Effectiveness of television advertisements by agrochemical companies in Karnataka region

Conclusion

The survey result concluded in the Bengaluru zone of Karnataka highlights key insights into the purchasing behaviour of agrochemical retailers and farmers. The majority of respondents were young to middle-aged and had completed at least school or college education. Medium and large landholding farmers dominated the sample, with most having over a decade of farming experience and primarily cultivating vegetables. There was high awareness and usage of ICT tools, particularly helpline services through incoming calls and SMS, among both retailers and farmers. Smartphone usage was notably high, supporting the

increasing adoption of agrochemical mobile applications, with the "N" app emerging as the most preferred. In terms of marketing reach, DuPont had the highest visibility in Karnataka through TV advertisements, while Rallis slightly led in the Bengaluru zone. Overall, the findings indicate a growing trend of digital engagement, improved communication, and informed decision-making among agrochemical stakeholders in the region.

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