# Technological Adoption in Agriculture: An Empirical Study of Farmers' Awareness, Adoption and Perception in Kolar and Mandya Districts of Karnataka

Nagma N[1], Dr. G L Parvathamma[2]
[1]*Research Scholar, Department of Economics, Bangalore University, Bangalore-560056*
[2]*Senior Professor, Department of Economics, Bangalore University, Bangalore-560056*

***Abstract*—Agricultural technology plays a pivotal role in enhancing farm productivity, resource efficiency, and sustainability. The present study examines farmers' awareness, adoption, and perception regarding agricultural technologies in Kolar and Mandya districts of Karnataka. Primary data were collected from 400 farmers, comprising 200 respondents each from Kolar and Mandya districts. The study employed descriptive statistics and cross-tabulation analysis to assess awareness levels, adoption patterns, motivational factors, confidence, satisfaction, and perceptions toward technology adoption. The findings reveal that while awareness and adoption of conventional technologies such as improved seeds, fertilizers, pesticides, tractors, irrigation systems, and harvesting machines are remarkably high, awareness and adoption of advanced precision farming technologies such as drones, weather forecasting tools, satellite imagery, GPS, GIS, and robotics remain extremely low. Peer influence emerged as the dominant motivational factor influencing technology adoption. Farmers generally exhibited positive perceptions regarding the role of technology in improving farm productivity, with higher confidence and satisfaction levels observed among farmers in Kolar district compared to Mandya district. The study highlights the necessity of strengthening extension services, farmer training programs, subsidies, and institutional support to accelerate the adoption of modern digital agricultural technologies.**

***Index Terms*—Agricultural Technology, Technology Adoption, Precision Farming, Farmers' Perception, Agricultural Innovation, Karnataka, Farm Mechanization.**

## I. INTRODUCTION

Agriculture remains a critical sector of the Indian economy, supporting rural livelihoods and ensuring food security. Technological advancements have transformed agricultural production systems by improving efficiency, productivity, and sustainability. Mechanization, improved seed varieties, irrigation technologies, pest management tools, and precision agriculture technologies have enabled farmers to enhance yields while optimizing resource utilization.

Despite significant technological advancements, adoption rates vary considerably across regions and farming communities. Several socio-economic, institutional, and infrastructural factors influence farmers' willingness and ability to adopt modern technologies. Understanding farmers' awareness, adoption behaviour, perceptions, and constraints is essential for designing effective agricultural policies and extension interventions. Karnataka is one of India's agriculturally progressive states, with varying levels of technological adoption across districts. Kolar and Mandya districts represent two important agricultural regions with distinct cropping patterns and farming systems. This study investigates the awareness, adoption, and perception of farmers towards agricultural technologies in these districts.

## II. OBJECTIVES OF THE STUDY

To assess farmers' awareness, adoption, and perception of agricultural technologies in Kolar and Mandya districts of Karnataka.

## III. RESEARCH METHODOLOGY

Research methodology constitutes the systematic framework adopted for collecting, analyzing, and interpreting data to achieve the objectives of a study.

The present investigation was undertaken to assess the awareness, adoption patterns, and perceptions of farmers towards agricultural technologies in Kolar and Mandya districts of Karnataka. The methodology adopted for the study is presented below.

Research Design: The study employed a descriptive and analytical research design. A descriptive design was considered appropriate because it facilitates the systematic collection of information regarding farmers' awareness, adoption behaviour, confidence, satisfaction, and perceptions towards agricultural technologies. The analytical approach was used to examine district-wide variations and interpret the relationships among different aspects of technological adoption.

Study Area: The study was conducted in Kolar and Mandya districts of Karnataka State. These districts were purposively selected due to their significant contribution to agricultural production and their varying levels of technological adoption in farming activities.

a) Kolar District: Known for horticultural crops, vegetable cultivation, and extensive use of irrigation technologies.

b) Mandya District: Predominantly characterized by sugarcane, paddy, and other irrigated crops supported by canal irrigation systems.

The selection of these districts enabled a comparative assessment of technology adoption among farmers operating under different agro-economic conditions.

Nature and Sources of Data: The study was based on both primary and secondary data.

Primary Data: Primary data were collected directly from farmers through a structured interview schedule. Information was gathered regarding awareness, adoption, and perception of agricultural technologies in Kolar and Mandya districts of Karnataka.

Secondary Data: Secondary information was collected from various sources.

Sampling Procedure: A multistage sampling technique was adopted for selecting respondents.

Stage I: Selection of Districts

Two districts namely Kolar and Mandya were purposively selected based on their agricultural importance and varying levels of technological intervention.

Stage II: Selection of Respondents

Farmers actively engaged in agricultural activities were identified and selected from the chosen districts.

Sample Size: A total of 400 farmers were selected for the study.

| District | Number of Farmers |
|---|---|
| Kolar | 200 |
| Mandya | 200 |
| Total | 400 |

The sample size was considered adequate to generate reliable and representative findings.

Development of Research Instrument: A structured interview schedule was developed by the researcher after reviewing relevant literature and consulting research guide and agricultural experts. The questionnaire included both closed-ended and multiple-choice questions to facilitate quantitative analysis.

Pilot Study: Before final data collection, a pilot survey was conducted among a small group of farmers to evaluate the clarity, relevance, and reliability of the interview schedule. The final schedule was then administered to the selected respondents.

Data Collection Procedure: Primary data were collected through personal interviews with farmers during the agricultural season. The investigator personally visited the respondents and recorded their responses.

## IV. RESULTS AND DISCUSSION

Awareness of Agricultural Technologies: The study found that all respondents (100%) were aware of the adoption of technology in agriculture. This demonstrates a strong foundation of technological awareness among farmers in both districts.

Awareness was highest for conventional technologies such as Tractors and power tillers (100%), Improved seeds (100%), Pest sprayer machines (100%), Drip and sprinkler irrigation systems (100%), Pesticides and fertilizers (100%). However, awareness of advanced technologies remained very low:

| Technology | Awareness (%) |
|---|---|
| Soil Testing Kits | 10.3 |
| Weeding Machines | 14.5 |
| Weather Forecasting Tools | 1.3 |
| Drones/Sensors | 2.8 |
| Satellite Imagery | 1.0 |
| GPS/GIS/Robotics | 1.0 |

The findings indicate that farmers are familiar with technologies directly associated with daily farming operations, whereas awareness regarding digital and precision agriculture technologies remains limited.

Adoption of Agricultural Technologies: Adoption patterns closely mirrored awareness levels. Technologies with highest adoption included:

| Technology | Adoption (%) |
|---|---|
| Improved Seeds | 100 |
| Pest Sprayer Machines | 100 |
| Pesticides | 100 |
| Fertilizers | 100 |
| Tractors & Power Tillers | 89.0 |
| Harvesting Machines | 84.2 |
| Drip/Sprinkler Irrigation | 66.7 |

Conversely, adoption of advanced technologies remained negligible:

| Technology | Adoption (%) |
|---|---|
| Soil Testing Kits | 4.5 |
| Weeding Machines | 5.0 |
| Weather Forecasting Tools | 0.5 |
| Drones/Sensors | 1.5 |
| Satellite Imagery | 0 |
| GPS/GIS/Robotics | 0 |

Kolar farmers demonstrated significantly higher adoption levels than Mandya farmers, especially for irrigation and mechanized technologies.

Technology Adoption Across Farming Stages: Technology use was concentrated in specific farming stages.

| Farming Stage | Adoption (%) |
|---|---|
| Land Preparation | 89.0 |
| Irrigation | 66.8 |
| Harvesting | 84.2 |
| Weeding | 5.0 |
| Sowing/Seeding | 0 |

The findings suggest that mechanization is primarily adopted where labour-saving benefits are substantial. Traditional methods continue to dominate sowing and weeding operations.

Motivational Factors for Technology Adoption: Peer influence emerged as the most influential factor motivating adoption.

| Motivational Factor | Percentage (%) |
|---|---|
| Peer Influence | 57.0 |
| Required to Use | 27.5 |
| Higher Productivity | 15.5 |

This indicates that social learning and farmer-to-farmer interaction play a critical role in technology diffusion.

Perception of Technology and Farm Productivity: Most respondents expressed positive perceptions regarding technology.

- Agree that technology improves productivity: 78.0%
- Strongly agree: 4.3%
- Neutral: 17.8%

Farmers recognized the role of technology in enhancing crop productivity, reducing labour dependence, and improving operational efficiency.

Confidence in Using New Technologies: The study revealed substantial confidence among respondents.

| Confidence Level | Percentage (%) |
|---|---|
| High | 59.3 |
| Very High | 4.3 |
| Moderate | 36.5 |

Kolar farmers exhibited significantly greater confidence compared to Mandya farmers.

Need for Government Support: Most respondents emphasized the importance of government support.

| Response | Percentage (%) |
|---|---|
| Somewhat Required | 75.3 |
| Required | 14.2 |
| Not Required | 10.5 |

The findings underscore the need for subsidies, training programs, and extension services to facilitate technology adoption.

Satisfaction with Technology Adoption: The majority of farmers expressed satisfaction with technology adoption.

| Satisfaction Level | Percentage (%) |
|---|---|
| Satisfied | 82.3 |
| Very Satisfied | 1.3 |
| Neutral | 16.5 |

Higher satisfaction levels were observed among Kolar farmers due to greater adoption of mechanized technologies.

Recommendation of Technology to Other Farmers: A large proportion of respondents were willing to recommend agricultural technologies.

| Response | Percentage (%) |
|---|---|
| Probably Yes | 78.0 |
| Definitely Yes | 4.3 |
| Not Sure | 17.8 |

This demonstrates positive farmer experiences and the potential for peer-driven technology diffusion.

## V. MAJOR FINDINGS

1. Universal awareness (100%) exists regarding agricultural technology adoption.
2. Conventional technologies enjoy widespread adoption, whereas precision farming technologies exhibit negligible adoption.
3. Kolar farmers demonstrate higher adoption, confidence, and satisfaction levels than Mandya farmers.
4. Peer influence is the strongest determinant of technology adoption.
5. Farmers generally perceive technology as beneficial for improving farm productivity.
6. Government support through subsidies and training is considered essential.
7. Digital agriculture technologies remain largely inaccessible and underutilized.

## VI. POLICY IMPLICATIONS

1. Strengthen agricultural extension services.
2. Conduct regular farmer training and capacity-building programs.
3. Promote precision agriculture technologies through demonstrations.
4. Increase subsidies for digital farming equipment.
5. Develop farmer-producer organizations for technology dissemination.
6. Improve access to weather forecasting and digital advisory services.
7. Encourage public-private partnerships to enhance technological outreach.

## VII. CONCLUSION

The study concludes that farmers in Kolar and Mandya districts possess strong awareness and positive perceptions toward agricultural technologies. However, technology adoption remains concentrated in conventional mechanization and input-based technologies, while precision agriculture technologies continue to exhibit extremely low adoption rates. Kolar district demonstrates comparatively higher technological advancement than Mandya district. Social influence, confidence, satisfaction, and perceived productivity benefits significantly contribute to technology adoption. To achieve sustainable agricultural modernization, policy interventions should focus on strengthening extension systems, improving digital literacy, providing financial incentives, and enhancing access to advanced agricultural technologies.

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