**A STUDY ON DIGITAL INNOVATION IN AGRICULTURE TRANSFORMING FARMING PRACTICES IN COIMBATORE**

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**ABSTRACT**

This study explores the impact of digital innovations on farming practices in Coimbatore, focusing on technologies like drones, sensors, and farm management software. It examines how these tools enhance productivity, resource efficiency, and sustainability in agriculture. The study also highlights challenges such as high costs, technical skill gaps, and limited internet access. By analyzing the benefits and obstacles of digital farming, the research provides insights into how these technologies can transform agriculture in Coimbatore and offers recommendations for overcoming barriers to adoption.

**1.1 INTRODUCTION**

Agriculture is vital for providing food, raw materials, and employment, but challenges like climate change and limited resources require innovation. Digital technologies such as drones, sensors, and AI are transforming farming, making it more efficient and sustainable. Coimbatore, a key agricultural hub in southern India, is embracing these technologies to improve productivity and resource management. Despite the benefits, challenges like high costs, lack of training, and limited internet access persist. This study explores how digital innovations are reshaping agriculture in Coimbatore, focusing on the opportunities and challenges they present for the future.

**1.2 STATEMENT OF PROBLEM**

While digital innovations offer solutions like precision farming and real-time monitoring, their adoption is limited due to factors like high costs, lack of awareness, and inadequate infrastructure. Coimbatore's agriculture faces challenges like inefficient traditional methods, resource scarcity, unpredictable weather, and limited market access. The purpose of this study is to examine the adoption, challenges, and impact of digital technologies in changing farming practices and improving productivity, sustainability, and profitability in Coimbatore.

**1.3 OBJECTIVES OF THE STUDY**

* To study the digital innovation in agriculture farming
* Understand the knowledge and skill gaps in using digital technologies
* To find the digital innovation practices in Coimbatore
* Identify the economic impact of digital technologies on farmers income

**1.4 LIMITATION OF THE STUDY**

* The study was restricted to a sample size of only 120 respondents, which may limit the generalizability of the findings.
* The study was conducted within a short period, which may have constrained the depth of data collection and analysis.
* The process of collecting primary data was time-consuming, posing challenges in gathering comprehensive responses

**1.5 HYPOTHESIS OF THE STUDY**

H0: There is no significant relationship between personal factors and increase in income.

**personal factor**: monthly income

**increase in income**: Precision Farming

**1.6 RESEARCH METHODOLOGY**

 Total size of sample respondents was 120. The required primary data were collected through questioners. The sample respondents were interviewed personally at the house. The secondary data such as physical, social, economic. Here the researcher used the Anova and ranking test for this study.

**1.7 REVIEW OF LITERATURE**

**Venkatraman, S. (2022)1. "Public-Private Partnerships in Advancing Digital Innovation in Agriculture: A Case Study in Coimbatore"** This study explored how public-private partnerships (PPPs) in Coimbatore are fostering digital innovation in agriculture. It found that PPPs help overcome barriers to technology adoption by offering financial support, training, and access to digital tools, which could boost productivity and sustainability.

**Meena, R. (2021)2. "Enam and Digital Integration in Indian Agriculture"**
The research assessed the impact of the Enam initiative on digital integration in Indian agriculture. It found that Enam improves market access, transparency, and income for farmers by reducing reliance on middlemen and providing direct market connections. Expanding the platform could further empower farmers.

**Chandrasekar, R. & Natarajan, A. (2020)3. "Role of Drones in Precision Agriculture: A Case Study in Coimbatore"** This study focused on the role of drones in precision agriculture in Coimbatore. It showed that drones improve crop monitoring, pest detection, and irrigation management, offering a cost-effective way to enhance farming efficiency and sustainability.

**Rajan, P. (2020)4. "Barriers to Technology Adoption in Rural Agriculture: A Study from Tamil Nadu"** The study investigated barriers to technology adoption in rural Tamil Nadu. It identified challenges like poor infrastructure and high costs as major obstacles, and suggested solutions such as affordable technologies, government incentives, and digital literacy to boost adoption and productivity.

**1.8 ANALYSIS AND INTERPRETATION**

**1.8.1 SIMPLE PERCENTAGE**

|  |  |  |  |
| --- | --- | --- | --- |
| **S.no** | **Particulars** | **No. of respondents** | **percentage** |
| 1 | Below 25 | 38 | 32 |
| 2 | 26-35 | 28 | 23 |
| 3 | 36-45 | 36 | 30 |
| 4 | Above 45 | 18 | 15 |
| **TOTAL** | **120** | **100** |
| **FARMING EXPERIENCE** |
| 1 | Less than 5 years | 53 | 44 |
| 2 | 5-10 years | 36 | 30 |
| 3 | More than 10 years | 31 | 26 |
| **TOTAL** | **120** | **100** |
| **ANNUAL INCOME FROM FARMING(IN INR)** |
| 1 | Below 50,000 | 24 | 20 |
| 2 | 50,001-1,00,000 | 38 | 32 |
| 3 | 1,00,001-2,00,0000 | 33 | 28 |
| 4 | Above 2,00,000 | 25 | 20 |
| **TOTAL** | **120** | **100** |

**INFERENCE**

From the above table, mostly 32% of the respondents belong to Below 25years of age, mostly 23% of the respondents belong to26-35 years of age, mostly 30% of the respondents belong to36-45 years of age, and mostly 15% of the respondents belong to above45 years of age.

Mostly44% of the respondents belong to Less than 5 years , mostly 30% of the respondents belong to5-10 years, 26% of the respondents belong to More than 10 years of farming experience.

Mostly 20% of the respondents belong to Below 50,000, mostly 32% of the respondents belong to50,001-1,00,000, mostly 28% of the respondents belong to1,00,001-2,00,0008, and mostly 20% of the respondents belong to Above 2,00,000 of annual income from farming.

**1.8.2 ANOVA**

To study the variance between the variables, one-way ANOVA with personal factors as the independent variable and respondents' opinions towards role of digital agriculture in achieving sustainability and environmental goals in farming as the dependent variable.

**NULL HYPOTHESIS(H0):** There is no significant difference among demographic variables of the respondents and respondents' opinion on the role of digital agriculture in achieving sustainability and environmental goals in farming

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **factor** | **Source of variations** | **Sum of squares** | **Df** | **Mean Square** | **F-value** | **P-value** | **H0** | **S/NS** |
| Precision Farming | Between Groups | 1.059 | 2 | .530 | .465 | .629 | accepted | NS |
| Within Groups | 133.266 | 117 | 1.139 |  |  |  |  |
| Total | 134.325 | 119 |  |  |  |  |  |
| Increased Efficiency | Between Groups | .283 | 2 | .141 | .185 | .831 | accepted | NS |
| Within Groups | 89.184 | 117 | .762 |  |  |  |  |
| Total | 89.467 | 119 |  |  |  |  |  |
| Initial Investment Costs | Between Groups | .535 | 2 | .268 | .281 | .756 | accepted | NS |
| Within Groups | 111.432 | 117 | .952 |  |  |  |  |
| Total | 111.967 | 119 |  |  |  |  |  |
| Data Privacy and Security | Between Groups | 10.970 | 2 | 5.485 | 3.798 | .025 | Rejected | S |
| Within Groups | 168.955 | 117 | 1.444 |  |  |  |  |
| Total | 179.925 | 119 |  |  |  |  |  |
| Regulatory Frameworks | Between Groups | 9.746 | 2 | 4.873 | 2.739 | .069 | accepted | NS |
| Within Groups | 208.179 | 117 | 1.779 |  |  |  |  |
| Total | 217.925 | 119 |  |  |  |  |  |

**\*p<0.05 S-Significant NS-Not Significant**

**INFERENCE**

It is found the calculated p-value is .629. This is greater than the significant value of 0.05. Hence, the null hypothesis(H0) is accepted. Hence there is no significant difference between the mean value of monthly income and the respondent's opinion on the Precision Farming

 Monthly income and Increased Efficiency shows that the calculated p-value is .831.This is greater than the significant value of 0.05. Hence, the null hypothesis(H0) is accepted. Hence there is no significant difference between the mean value of monthly income and the respondent's opinion on the Increased Efficiency.

 Monthly income and Initial Investment Costs shows that the calculated p-value is .756. This is greater than the significant value of 0.05. Hence, the null hypothesis(H0) is accepted. Hence there is no significant difference between the mean value of monthly income and the respondent's opinion on the Initial Investment Costs.

Monthly income and Data Privacy and Security shows that the calculated p-value is .025. This is less than the significant value of 0.05. Hence, the null hypothesis(H0) is rejected and alternative hypothesis is accepted. Hence there is significant difference between the mean value of monthly income and the respondent's opinion on the Data Privacy and Security.

Monthly income and Regulatory Frameworks shows that the calculated p-value is .069. This is greater than the significant value of 0.05. Hence, the null hypothesis(H0) is accepted. Hence there is no significant difference between the mean value of monthly income and the respondent's opinion on the Regulatory Frameworks.

**ROLE OF DIGITAL AGRICULTURE IN ACHIEVING SUSTAINABILITY AND ENVIRONMENTAL GOALS IN FARMING**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Factor** | **1** | **2** | **3** | **4** | **5** | **Total weighted average** | **rank** |
| Precision farming | 75(1) | 23(2) | 12(3) | 6(4) | 4(5) | 201 | IV |
| Increased efficiency | 18(1) | 70(2) | 20(3) | 10(4) | 2(5) | 268 | III |
| Initial investment costs | 30(1) | 34(2) | 45(3) | 10(4) | 1(5) | 191 | V |
| Data privacy and security | 33(1) | 33(2) | 24(3) | 24(4) | 6(5) | 297 | II |
| Regulatory frameworks | 34(1) | 33(2) | 25(3) | 12(4) | 16(5) | 303 | I |

(Source: primary data)

**INTERPRETATION**

The role of digital agriculture in achieving sustainability and environmental goals by ranking key factors based on their weighted averages. The findings indicate that regulatory frameworks (303) are the most crucial, emphasizing the need for clear policies to support digital agriculture. Data privacy and security (297) rank second, highlighting concerns over protecting sensitive agricultural data. Increased efficiency (268) follows, showing that improving productivity is a major priority. Precision farming (201) is ranked fourth, suggesting that while beneficial, it is not as critical as efficiency and security. Initial investment costs (191) are the least influential, implying that financial barriers exist but do not outweigh the importance of regulations, security, and efficiency.

**INFERENCE**

The results suggest that strong governance and data protection are key to the successful adoption of digital agriculture.

**1.9 SUGGESTIONS**

* To enhance digital innovation in Coimbatore’s agriculture, farmers should adopt precision farming, smart irrigation, AI-driven analytics, and drone monitoring to optimize productivity.
* Blockchain can improve supply chain transparency, while mobile apps and e-commerce platforms enable direct market access.
* Government and private sector collaboration should provide financial support, training, and digital literacy programs.
* Robotics, automation, cloud-based data management, and renewable energy integration will further improve efficiency, sustainability, and profitability in farming

**1.10 CONCLUSION**

Digital innovation is revolutionizing agriculture in Coimbatore, enhancing efficiency, productivity, and sustainability. Technologies like precision farming, AI, IoT, blockchain, and automation enable data-driven decisions that improve crop yields and resource management. Despite challenges such as limited digital literacy and high implementation costs, a collaborative effort from the government, private sector, and farmers can overcome these barriers. By investing in training and financial support, Coimbatore’s agricultural sector can achieve greater profitability, sustainability, and resilience, positioning farmers to tackle future challenges and thrive in a digital world.

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