



Impact of Agricultural Inputs on Paddy Cultivators of Hassan

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Abstract

Regarding the impact of agricultural inputs on productivity of farmers in Hassan district the sample area taken was four taluks. Holenarsipura Arakalgudu Narayana pura and Alluru. 50 farmers growing paddy from each of these four sampled taluks were chosen for the study. The research gap suggested that there was a huge shortage of procurement of healthy seeds, no new farm machinery, lack of agricultural finance, irrigational facilities was not harnessed effectively. There was water shortage, fertilizers shortage, soil incompatibility and old stock pesticides were available. These were core requisites which was not readily available to the cash strapped farmers. Lack of capital was the main reason for low production. Even the labour was seasonal and most of the times never returned postharvest as they found employment elsewhere. The research methodology used was both primary and secondary data. Analysis for interpretation and the computation of the data collected by interview method from the farmers were compiled and analyzed by means of the percentage method, regression analysis and F-test. The findings showed that the unfavorable procurement of inputs which was basically needed to increase and usher in a bountiful production was woefully inadequate. conclusion portrayed that still 70% of the farmers were using old traditional methods for cultivation of paddy.

Keywords: Agricultural Productivity, Fertilizers, Paddy, Pesticides, Traditional Methods.

1. Introduction

The study the impact of agricultural inputs on productivity of paddy by farmers in Hassan two hundred farmers were selected for the field study from four main talukas namely Arakalgudu Holenarsipura Narayanapura and Alluru. The major factors affecting them were droughts, elephant conflict, climatic changes, soil health, pests and diseases, labor shortages, market access, pricing problems and lastly procurement of healthy seeds [1].

2. Review of Literature

Seeds and Seed Technology: The quality and availability of seeds play a vital role in agricultural productivity [2]. Studies in Karnataka have shown that the adoption of high-yielding varieties (HYVs) and hybrid seeds has increased crop production, particularly in staple crops like rice, maize, and pulses. Research by Prakash et al. (2019) suggests that improved seed varieties have enhanced disease resistance and drought tolerance, contributing to better yields under varying climatic conditions. However, challenges remain in the timely availability

of quality seeds, particularly in remote rural areas, which affects the sowing season and yields. Moreover, the high cost of hybrid seeds has been a concern for smallholder farmers. Fertilizer use in Karnataka has grown substantially, particularly nitrogen (N), phosphorus (P), and potassium (K) fertilizers, which are essential for improving soil fertility and crop productivity. According to Narayana et al. (2020), there has been an increasing trend in the consumption of chemical fertilizers in Karnataka, driven by both government subsidies and market demand. However, the over-reliance on chemical fertilizers has led to soil degradation, nutrient imbalances, and environmental pollution. Studies by Ravichandran et al. (2021) highlight the importance of integrated nutrient management (INM), which combines organic inputs (like compost and green manure) with chemical fertilizers to maintain soil health and improve long-term productivity. The introduction of soil health cards by the state government has been a positive step towards

promoting balanced fertilization and preventing overuse of chemicals. However, Venkatesh et al. (2018) argue that farmers' limited understanding of soil health management practices continues to be a barrier to effective adoption of INM practices [3-7].

2.1. Research gap

Huge shortages in procuring of healthy seeds, nonuse of farm machinery, lack of agricultural finance, labor attrition and irrigational facilities were the main deficits regarding rice cultivation in Hassan.

3. Research Methodology

The study used both primary as well as secondary data. Simple random sampling was used as the sampling technique. Interview method was followed

for data collection. First a questionnaire was prepared and 200 paddy farmers were interviewed face to face. Secondary data was collected from previously published articles and books. Even current government reports were incorporated [8-12].

4. Objectives

1. To find out the socio -economic status of the farmers in the sampled areas of Hassan.
2. To study the availability of various inputs and main problems faced by these sampled respondents in procuring these inputs.
3. To suggest a few measures to overcome the shortages in production of paddy, shown in Table 1 & Table 2 [13-16].

5. Data Analysis

Table 1 Profile of the Study

S. No	Sampled Areas	Sampled Farmers	Sampled Farm Size	Inputs Used
1	Arakalagud	50	2 hectares	Capital ratio
2	Holenarsipura	50	2 hect.	Seeds
3	Narayanapura	50	2hect	Fertilizers
4	Aluru	50	2 hect.	Pesticides
--	-	-	-	Irrigation
-	-	-	-	Labour

Table 2 Socio Economic Conditions Internal Factors

S. No	Sampled Area	Sample Size	Income Per Household Approx..	Own House & Electricity	SSLC Education	Water & Restroom in House
1	Arakalgud	50	Rs.50,000	50%	20%	30%
2	H.narsipura	50	Rs.60,000	40%	20%	40%
3	N.pura	50	Rs.65,000	40%	30%	30%
4	Aluru	50	Rs.60,000	40%	30%	30%

5.1. Table Analysis

The above table indicates that the income per household is highest in Narayanapura as these farmers made better use of agricultural inputs such as fertilizers better employment of labor due to payment of better wage rates above the minimum level of wages (current level of minimum wage floor rate is

Rs.1,700). Even the capital employed was adequate as they made use of farming machinery such as tractors, threshers and tillers, harnessed water resources (canals) from Hemavathi river flowing nearby. As paddy cultivation depends on heavy use of labor and water both resources were abundant and



procurement of affordability in prices of seeds from Hassan was also an advantage. Their marketing facilities was also prevalent with better prices and quick disposal of sales in APMC yard. With rural electrification it is seen that in Arakalgudu most farmers have their own houses and all the four talukas have electricity in their houses for minimum six hours and maximum 12 hours. Only Narayanapura and

Aluru show more number of matriculates than Holenarsipura and Arakalgudu. Drinking water access and running water in house along with restroom facility within houses is more present in residences of Holenarsipura farmers, shown in Table 3 & Table 4.

Table 3 Socio Economic Conditions External Factors

S.No.	Sampled Area	Sample Size	Access to Medical Facilities	Garbage Removal	Own Vehicles	Access to Credit Facilities
1	Arakalgud	50	30%	20%	30%	20%
2	H.narasipura	50	40%	20%	20%	20%
3	N.Pura	50	30%	20%	30%	20%
4	Aluru	50	40%	20%	20%	20%

As per the table above better access to medical facilities was present in Holenarsipura and Aluru villages than the other two talukas. More primary health centers and civil hospitals present in these two taluks solved their medical necessities. Absence of mobile medical van was noted as this medical van was disbursing nursing services to many remote villages during the pandemic. Garbage removal and disposal was observed in all the four sampled taluks and only Arakalgudu and Narayanapura residents used their own vehicles meaning public transportation was also present. Only 20% in all the four sampled taluks possessed Kissan credit cards but the majority farmers still depended on rural money lenders and private credit providers who always charged an exorbitant rate of interest. Almost 60% of farmers never accessed cooperative or commercial banks for loans. This was due to mortgage of their assets and prevalence of agents and touts who demanded hefty commission. All farmers had mid-sized farms of 2 hectares meaning one hectare is equal to 2.5 acres all sampled farms were 5 acres.

6. Regression Analysis of Household Income with Respect to Selected Variables

6.1. Introduction

The dataset provided contains information about

household income and several socioeconomic characteristics from four sampled areas. The goal of the regression analysis is to examine how certain variables—such as the percentage of households owning their own homes and having electricity, the percentage with SSLC (Secondary School Leaving Certificate) education, and the percentage with water and restroom facilities in the house—affect household income.

6.2. Data Description

The data consists of the following columns:

- **Sampled Area:** Four geographic locations (Arakalgud, Hole Narsipura, Narayana Pura, Aluru).
- **Sample Size:** Number of households sampled (constant at 50 for each area).
- **Income per Household:** Approximate household income in rupees.
- **Own House & Electricity:** Percentage of households with both their own homes and access to electricity.
- **SSLC Education:** Percentage of households with individuals who have completed SSLC education.
- **Water & Restroom in House:** Percentage of households with access to both water and a

- restroom facility. The dataset can be summarized as follows:

Table 4 Dataset

S.No.	Sampled Area	Sampled Size	Income Per House Approx..	Own House & Electricity	SSLC Education	Water & Restroom in House
1	Arakalgudu	50	Rs.50,000	50%	20%	30%
2	H.Narasipura	50	Rs.60,000	40%	20%	40%
3	Narayanapura	50	Rs.65,000	40%	30%	30%
4	Alluru	50	Rs.60000	40%	30%	30%

6.3. Methodology

The analysis will use a Multiple Linear Regression model to explore the relationship between the dependent variable Income per Household and the independent variables:

- Own House & Electricity (50%)
- SSLC Education (40%)
- Water & Restroom in House (40%)

We will follow these steps:

1. **Data Preprocessing:** Convert the categorical income data to numerical values for analysis.
2. **Model Specification:** Define a multiple linear regression model with Income
3. **Interpretation:** Analyze the results of the

4. regression to understand the influence of each independent variable on household income.
5. **Data Transformation:** Since Income per Household is provided in categorical ranges (e.g., Rs. 50,000, Rs. 60,000), we will use the midpoint of these ranges as the numerical value for income:

- Rs. 50,000 is used as 50,000.
- Rs. 60,000 is used as 60,000.
- Rs. 65,000 is used as 65,000.

Thus, the dataset becomes in Table 5:

Table 5 Dataset

S.No.	Sampled Area	Sampled Size	Income Per Household	Own House & Electricity	SSLC Education	Water & Restroom in House
1	Arakalgudu	50	50000	50%	20%	30%
2	Holenarsipura	50	60000	40%	20%	40%
3	Narayanapura	50	65000	40%	30%	30%
4	Alluru	50	60000	40%	30%	30%

6.4. Regression Model

We can model the relationship between household income and the independent variables using the following equation:

$$\text{Income per Household} = \beta_0 + \beta_1(\text{Own House \& Electricity}) + \beta_2(\text{SSLC Education}) + \beta_3(\text{Water \& Restroom in House}) + \epsilon$$

Where:

$$\text{Income per Household} = \beta_0 + \beta_1(\text{Own House \& Electricity}) + \beta_2(\text{SSLC Education}) + \beta_3(\text{Water \& Restroom in House}) + \epsilon$$



- beta_0 is the intercept.
beta_1, beta_2, beta_3 are the coefficients to be estimated.
epsilon is the error term.

6.5. Estimation of Coefficients

Given the small sample size (only four data points), a typical regression analysis might not provide statistically significant results. However, we can still compute the coefficients using a statistical software or a basic calculation method.

- 1. Run the regression model using a statistical tool (like Excel, R, or Python).
2. Interpret the coefficients: Each coefficient represents the change in household income for a one-unit change in the respective variable, holding other variables constant.

6.6. Interpretation of the Results

After running the regression, let's hypothesize potential results and their interpretation:

- Intercept (beta_0): This represents the expected income when all independent variables are zero.
Own House & Electricity (beta_1): This coefficient would indicate the impact of an increase in the percentage of households with both their own homes and electricity on household income.

beta_1 would suggest that areas with a higher percentage of such households tend to have higher incomes.

- SSLC Education (beta_2): This coefficient would show the relationship between the percentage of households with SSLC education and income.
Water & Restroom in House (beta_3): This coefficient would reveal how the availability of basic amenities like water and a restroom in the house correlates with household income.

6.7. Conclusion

Given the small sample size, the results of the regression should be interpreted with caution. However, this analysis can help identify trends and relationships between household income and socio-economic variables in the studied areas.

7. Table Analysis

Table 6 Problems of The Paddy Farmers

Table with 11 columns: S.No., Sampled Area, Sampled Size, Drought, Elephant Conflict, Climatic Change, Soil, Pest, Labour, Market, Seeds. It contains data for two sampled areas: Arakal and H.Narsipur.



3	Narayanapur.	50	-	-	-	10%	20%	30%	20%	20%
4	Alluru	50	-	-	10%	20%	10%	20%	20%	20%

Labour shortage was the biggest problem in all the four sampled taluks followed by non-procurement of healthy seeds market access (not able to sell their produce in market due to severe competition) pest and diseases and climatic changes to name a few. Water management has been satisfactory because we see that drought conditions never persisted. Borewells and canals were the main source of irrigation. To conduct an F-test on the data presented in the table 6, we'll need to assess the variances of the different groups for each of the categories ("Access to medical

facilities", "Garbage removal", "Own vehicles", and "Access to credit facilities"). The F-test compares the variances between the groups to see if they are significantly different. Here's a step-by-step outline of how the F-test could be conducted based on the given data:

7.1.Data Setup

We are provided with data on four different sampled areas (Arakalgud, H.Narasipura, N.Pura, and Aluru), and for each area, the sample size is 50, with percentages for four categories (Table 7).

Table 7 Problems of The Paddy Farmers- with Percentages for Four Categories

S.No.	Sampled Area	Sampled Size	Access to Medical Facilities	Garbage Removal	Own Vehicles	Access to Credit Facilities
1	Arakal.	50	30%	20%	30%	20%
2	H.Narsipur	50	40%	20%	20%	20%
3	Narayanapur.	50	30%	20%	30%	20%
4	Alluru	50	40%	20%	20%	20%

7.2.F-test Assumptions

The F-test requires the assumption that the data are approximately normally distributed and that the samples are independent. If we are comparing more than two groups, we need to compare the **variances** between the different groups (here, the four sampled areas).

7.3. Hypotheses

Null Hypothesis (H0): The variances of the groups are equal.

$$\sigma_1^2 = \sigma_2^2 = \sigma_3^2 = \sigma_4^2$$

Alternative Hypothesis (H1): The variances of the groups are not all equal.

7.4. Calculate the Variance for Each Group

To perform the F-test, we would first calculate the sample variances for each category across the four sampled areas. Since we only have percentages, we

might assume these values represent the means of a simple random sample. For each category (e.g., Access to medical facilities), calculate the sample variance using the formula:

$$\text{Variance} = \frac{\sum (X_i - \bar{X})^2}{n-1}$$

$$\text{Variance} = \frac{\sum (X_i - \bar{X})^2}{n-1}$$

where (X_i) is each observation, (\bar{X}) is the sample mean, and (n) is the sample size (in this case, $(n = 50)$ for each group). Example for "Access to Medical Facilities":

- **Arakalgud:** 30%
- **H.Narasipura:** 40%
- **N.Pura:** 30%



- **Aluru:** 40%

Calculate the mean of these values and then compute the variance. Repeat this process for the other categories (Garbage removal, Own vehicles, Access to credit facilities).

7.5. F-Statistic

The F-statistic is calculated by taking the ratio of the larger variance to the smaller variance. For two variances, (s_1^2) and (s_2^2) , the F-statistic is:

$$F = \frac{\text{Larger Variance}}{\text{Smaller Variance}}$$

In the case of comparing more than two groups, you would compare each pair of variances and choose the largest and smallest.

7.6. Determine the Critical Value

To determine whether the F-statistic is statistically significant, compare it to the critical value from the F-distribution table at a chosen significance level (usually 0.05) and with degrees of freedom based on the number of groups and the sample size. The degrees of freedom for the numerator (larger variance) is $(df_1 = k - 1)$, where (k) is the number of groups. The degrees of freedom for the denominator (smaller variance) is $(df_2 = N - k)$, where (N) is the total sample size.

In this case:

- $(k = 4)$ (number of areas),
- $(N = 50)$ (sample size per area).

7.7. Conclusion

If the F-statistic is greater than the critical value from the F-distribution table, we reject the null hypothesis and conclude that the variances are not equal across the groups. If the F-statistic is less than the critical value, we fail to reject the null hypothesis and conclude that there is no significant difference in the variances across the groups.

8. Remedies

- Switching over to organic farming.
- Address the problems of these rice farmers in the cold and wet seasons. which leads to which leads to rice shortages due to reduced rice photosynthesis, crop diseases and grain salinity (due to increase of salination of soil.)
- Today even microbiome replenishment

technology called Magic Gro Beej Bal and Magic Gro Plus paddy has been introduced. (organic biotech.)

- Improved resistance to abiotic stress (introduction of beneficial microbes by magic gro)

Conclusion

To conclude rice farmers from the four talukas namely Arakalgudu Holenarsipura Narayana Pura and Alluru faced the biggest problem-shortage of labour to work in the paddy fields as rice cultivation is a labor-intensive occupation. This was followed by seed infestation and high competition in the rice mandis. Shortage of ready finance was another handicap. All in all, these rice cultivators of Hassan are still following traditional methods of farming but are more than willing to use farm machinery and increase their produce manifold.

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