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Impact of Total Expenses & Labor on the Value of Wheat with a Special Reference to Sustainable Development Goals

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Abstract: ***The framework for sustainable development consists of 17 Sustainable Development Goals (SDGs). The SDGs comprise objectives, benchmarks, and measures for combating poverty, guaranteeing food security, pursuing sustainable agriculture, protecting the environment, encouraging peace, and other issues. One of the most important areas of the Indian economy is agriculture, which provides a living for over 70% of the country's population. In addition, there aren't many job opportunities in other sectors. As a result, it is necessary to study the agriculture sector from the standpoint of sustainable development and make some suggestions for its improvement. This paper develops a statistical regression model to estimate the value of wheat. The study's findings imply that the government should take the required actions to increase farmers' access to funding and raise the standard of the educational programs, training resources, and extension services that are available to them. In order to raise the price of wheat and ultimately their profit, farmers should also invest more money in premium seeds and fertilizers.***

Keywords: Sustainable development, Goal, Agriculture, Wheat, Regression

I. INTRODUCTION

17 Sustainable Development Goals (SDGs) make up the framework for sustainable development. The SDGs include goals, benchmarks, and actions for a variety of challenges, including eradicating poverty, ensuring food security, promoting sustainable agriculture, preserving the environment, and promoting peace. Over 70% of the population of India depends on agriculture as a source of income, making it one of the most significant sectors of the Indian economy. Additionally, there aren't many employment options in other industries. As a result, it is essential to examine the agriculture industry from the perspective of sustainable development. In the backdrop of India, agriculture's importance is crucial. India has attained macro-level food independence, notwithstanding this. Major problems include widespread rural poverty, child undernourishment, and a lack of food continue plague the nation. Because agriculture continues to be the primary source of employment for most rural residents, there is still a lot of pressure on the industry to boost production. Agriculture provides benefits to the environment, a means of subsistence, and a way of life that significantly contributes to development. In order to maximize their profit, farmers' first priority is to enhance agricultural production.

II. IMPACT OF TOTAL EXPENSES AND OTHER LABOR ON THE VALUE OF WHEAT

The primary goal of this research study is to use the Cobb-Douglas production function to create a statistical model of the wheat production process. The supposition is that the value of wheat (as a production output and a selling price) is unaffected by labor and capital costs, including those associated with irrigation, seeds, fertilizers, and other costs. Using the SPSS computer program, the observed values of each of these variables are first converted into log-linear values. Additionally, using the SPSS software, multiple linear regression analysis was carried out at a.05 significance level. Below are the findings of the multiple linear regression analysis's necessary assumptions test. According to Jesus Felipe, the Cobb-Douglas production function is still the most popular kind in theoretical and empirical assessments of productivity and growth. [3]. Dr. Md. Arif Billah examines one of the main obstacles in rice farming. [2] by using cobb Douglas production function. The majority of current research on productivity, growth, and labor is based on theories regarding the properties of aggregate production functions. According to Pia Ghoshal [6], Technology, the efficiency of the production process, and the environment in which production units operate all have an impact on productivity. Crop development and production are also encouraged by the right fertilizer application rate.

However, in order to save capital expenditures, it is imperative to use fertilizers as little as possible to minimize their negative impacts on the environment and soil. [7].

The relationship between the three variables labor, capital, and product was established by Cobb, C. W., and P. H. Douglas in 1928[1]. A Cobb-Douglas production function models the relationship between production inputs (factors) and production output. This study examines the Amravati district's wheat production method. Data was gathered from 96 wheat-producing farmers who had 388 acres of land planted with wheat between April 2023 and June 2023. Simple random sampling is used to choose the sample. Farmers provide information on operational holding, area planted with wheat, cost of seeds, cost of fertilizer, cost of irrigation, cost of labor, cost of transportation, other costs, production of wheat, and cost of selling wheat. The formulation of this model is based on research done by Maryouma E. Enaami et. al [5], Keyzer et. al. [4]. The data is analyzed by using Excel and SPSS.

The production function is defined as

$Y = \propto x_1^{\beta_1} x_2^{\beta_2} e^{u}$----------1

Where,

X_1 = Total Expenses

X_2 = Expense on Labor

$\propto$ = intercept of function

By taking natural logarithm on both side of equation 1 we have

log Y=log$\propto$+$\beta_1$logx_1+$\beta_2$logx_2+u ----------2

The constants $\beta i's$ are the coefficient to be estimated.

III. RESULT & DISCUSSION

The main aim of this research study is to develop a statistical model for wheat production process by using the Cobb-Douglas production function. The hypothesis is that there is no impact of labor and capital expenses (including expenses on seeds, fertilizers, irrigation, and other expenses) on the value of wheat (product of production and selling price). The observed values of all these variables are first transformed into log-liner values using the SPSS computer program. Further, multiple linear regression analysis was performed at a .05 significance level using the SPSS computer program. The required assumptions test results for multiple linear regression analysis are reported below. Assumptions testing is as follows.

The variance inflation factor (VIF) value of both the independent variables viz. total expenses (VIF=1.282) and labor expenses (VIF=1.282) are much below the threshold value of 5. Moreover, the tolerance values of both the independent variables viz; total expenses (tolerance=0.78) and labor expenses (tolerance=0.78) are much above the threshold value of 0.2. This indicates that there is no multi-collinearity among both independent variables.

Moreover, the maximum value of Cook's distance is 0.346 which is less than one. This indicates that, there are no influential outliers in the data sets.

The values of standard residuals are ranging between -2.946 and 1.954 which is well within the stipulated range of -3 to +3 (Figure 1). This ensures that the residuals are normally distributed (Figure 2). The Durbin-Watson value (1.857<4), indicates that the residuals are uncorrelated. So, the data collected for modeling the Cobb-Douglas Production function holds all the assumptions of multiple linear regression.

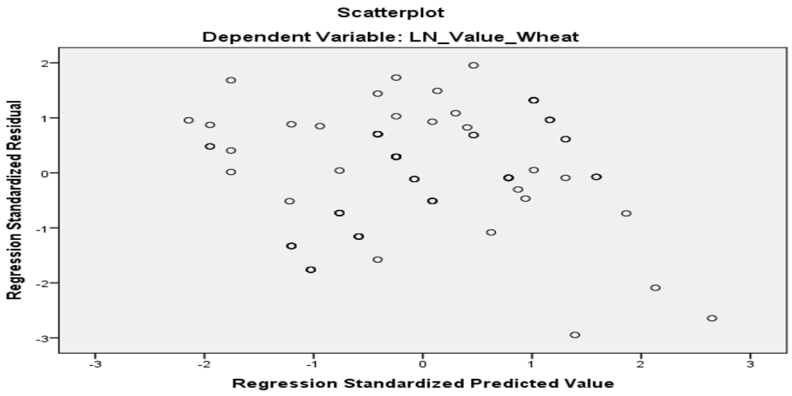

Figure 1: Scatterplot

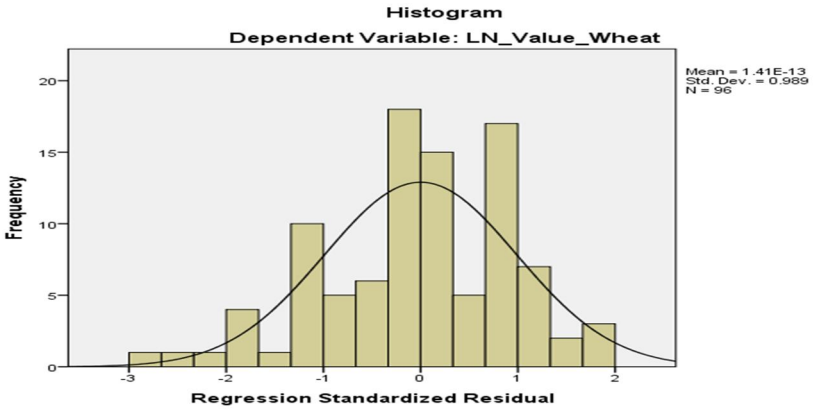

Figure 2: Histogram

Table 1: Mean, SD, and Correlations

Dependent Variable: Value of Wheat	Mean	SD	Correlation Coefficient	p-value	Result
Total Expenses (LN_Capital)	8.67	.089	0.904**	0.00	Significant
Labor Expenses (LN_Labor)	8.84	.048	-0.602**	0.00	Significant

IV. REGRESSION COEFFICIENT INTERPRETATION

The mean, SD, and correlation coefficients are reported in Table 1. The results of multiple correlation analysis (Table 1) show that, total expense is having a very strong, positive and significant impact on value of wheat ($r=0.904$, $p<0.05$). However, the labor expense is having a moderate, negative but significant impact on the value of wheat ($r=-0.602$, $p<0.05$).

A. Cobb-Douglas Production Function Model Details Are As Follows

The results of multiple linear regression analysis show a significant overall impact of both the independent variables on the value of wheat ($F=279.851$, $p<0.05$) with $R^2 = 0.858$, suggesting a remarkable 85.8% variation in the value of wheat explained by total expenses and labor expenses. The results indicate that (Table 2), the regression coefficients of total expenses ($\beta1= 1.471$, $p<0.05$), and labor expenses ($\beta2= -0.781$, $p<0.05$) are found to be significant. Therefore, the estimated value of wheat can be predicted by using the following regression mathematical model:

Estimated (LN Value of Wheat) = LN (4.217) + 1.471 LN (Total Expenses) – 0.781 LN (Labor Expenses)

Total expenses are found to be the highest predictor of the value of wheat ($r=0.904$, $p<0.00$) followed by labor expenses ($r= -0.602$, $p<0.00$).

Table 2: Factors Affecting Happiness with Investment Decision

Factors Affecting Value of Wheat	Regression Coefficient	t-value	Sig.	Result
Intercept	4.217	2.365	0.020	Significant
Total Expenses (X1)	1.471	17.971	0.000	Significant
Labour Expenses (X2)	-0.781	-5.168	0.000	Significant
R^2	0.858			
Adjusted R^2	0.854			
F	279.851	-	0.00	Significant
N	96	-	-	

B. Interpretation Of Regression Coefficients Is As Follows

The regression coefficient β1 = 1.471 indicates that if total capital is differed by one unit (and labor expenses did not differ) then the value of wheat will differ by 1.471 units, on average. The regression coefficient β2 = -0.781 indicates that if labor expense is differed by one unit (and total capital did not differ) then the value of wheat will differ by -0.781 units, on average.

The value of β1 + β2 is 0.69, indicating decreasing returns to scale.

V. CONCLUSION

In this study the Cobb-Douglas production function is used to create a statistical model for the wheat production process. The hypothesis is that the value of wheat (as a production output and a selling price) is unaffected by labor and capital costs, including those associated with irrigation, seeds, fertilizers, and other costs and this hypothesis is rejected. The Amravati region has the ability to enhance wheat production, which will benefit the local economy. Wheat production and nutrition would increase with the creation of new cultivars that are nutrient-rich, high-yielding, early-maturing, drought resistant, salt-tolerant, disease-resistant, cold tolerant, and high-temperature tolerant. A higher wheat production will result from effective crop management techniques. According to the study's conclusions, the government should take the necessary steps to improve farmers' access to funding and elevate the caliber of the training materials, extension services, and educational programs on optimum use of resources that are accessible to them. Additionally, producers should spend more money on high-quality fertilizers & seeds to raise the price of wheat, which will ultimately increase their profit.

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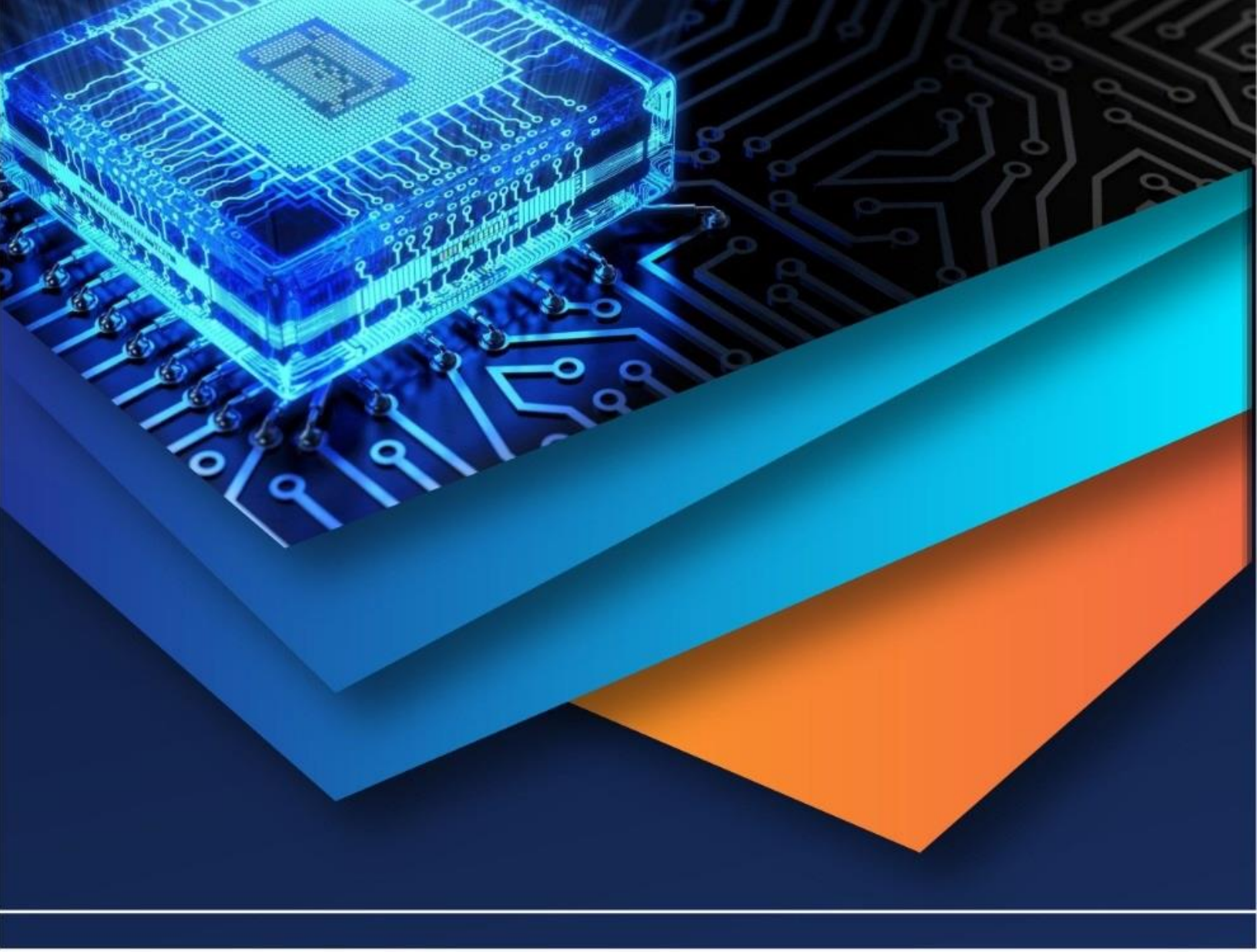

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