

Factors Affecting Sugarcane Production of the Credit Owner Farmers of Zarai Tarqiati Bank Limited in Rural area of District Mardan

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Abstract

The study was arranged in rural area of district Mardan in 2012. The major objective of the study was to analyze the effect of different factors on sugarcane production of the credit owner of ZTBL in the study area. Total 105 sugarcane growers were selected from 260 ZTBL beneficiaries. With the help of interview schedule data were collected from the respondents and analyzed with the help of Cob Douglass Production Type and Quintile Regression Function. The result indicates Estimated Results of the Sugarcane per Hectare Yield (kg) of Cob Douglass Production Function of the Respondents in the Study area. According to result, the un-standardized coefficients of land, plough, seeds, fertilizer, pesticides, labor days, irrigation and credit were estimated .037, -.066, .114, .063, -.012, 1.035 and .155 respectively. The plough, pesticides and credit coefficients were found non-significant, while the remaining were found highly significant. The plough and pesticides relationship with Yield of sugarcane was found inversely, while the remaining independent variables relation were found positive with sugarcane production. The R^2 value was found 0.804, which shows the explanatory power of the model, while the F-value was estimated 128.45 and p-value was .000 which shows the significance of overall independent variables in the model. The total output elasticity was found 1.608, which reflects the increasing return in scale and indicates that if one unit input is used for production, then 1.608 units output will be produced. According to Quintile Regression the un-standardized coefficient constant value was 6.203, while land, plough, seeds, fertilizer, pesticides, labor days, irrigation and credit coefficients value were 0.0103, 0.006, 0.186, 0.032, 0.32 0.172, 0.923 and 0.058 respectively. All variables coefficients were found significant at .05 level and relation with Yield was found positive. If all variables, one percent input of each variables will be applied for production, then land, plough, seeds, fertilizer, pesticides, labor days, irrigation and credit will take positive change 0.0103, 0.006, 0.186, 0.032, 0.32 0.172, 0.923 and 0.058 percents respectively, in the yield of the sugarcane. The R^2 value was estimated 0.66, which explain the power of the model and explain 66% variation of the independent variables in the production. The raw sum of deviations was 32.78 and minimum sum of deviations was 11.11, while the total elasticity of the output was 1.42, which shows the increasing return in scale. The elasticity of total output of parametric model was found more than the non-parametric model and reflects more increasing return scale than the non-parametric model. Due to heterodoscicy problem the parametric model, misguided the result of the increasing return in the Cob Douglass production function. The cost of the inputs in the study area is very high and because of this they can not apply the required input to their field and get the production less than the expected production which is gained in the developed countries of the world. The farmers have got loan from the bank while the amount was less than the requirement, so it is highly recommended to government of Pakistan to provide loan according to their requirement on free interest basis because when the purchasing power of the farmers were high then they easily purchase inputs in time for enhancement of their production. Good market, Support and Subsidied price were also recommended for uplifting the sugarcane production in the study area.

Keywords: Factors Affecting, Sugarcane Production, Credit Owner of ZTBL, Rural Area, District Mardan

1. Introduction

Sugarcane is a main cash crops of Pakistan and it is cultivated for sugar and sugar-related production in the country. It contributes 31 percent to agriculture and 0.6 percent to GDP while achieved US\$ 171.78 million in sugar exports during July-March, 2015. The sugarcane area day by day decreasing which caused a 7.1% decline in production cultivated decreased by 2.7 percent, which caused a 7.1 percent decline in production. Further, calculated average yield of sugarcane reportedly declined -4.5 percent (1). Sugarcane production is influenced by numerous factors. Among these factors water, land preparation, number of irrigation, fertilizers, seed and labor are very well known however without these inputs the production of agriculture is impossible (Khan et al. 2017). This crop is sown in the month of December till February, while harvested in the month of November till end of March. The total area under sugarcane crop in 2009-10 was 1080000 hectares in Pakistan while out of total 689000 hectares in Punjab, 280000 hectares in Sind, 110000 hectares in KP and 1000 hectares in Baluchistan province. The total Yield was 53600000 metric tons in Pakistan, while out of total 33500000 metric tons was in Punjab, 15350000 tons in Sind, 4700000 metric tons in KP, while 50000 metric tons was in Baluchistan. The highest Yield was found in Punjab province and was followed by Sind (ijcrb.web.com). Gur and sugar are

manufactured from sugarcane in Pakistan. From Gur and sugar large numbers sweets by products are prepared, which are consumed by people inside the country or exported to other country and earn foreign exchange from this crop. A mature stalk is consisted of fiber 11-16%, sugar 12-16%, non sugar 2-3% and water share is 63-73%. The average yield of sugarcane is 60-70 tons per hectare per year. However, this figure can vary between 30 and 180 tons per hectare in different zone of the world. Sugarcane is grown as a cash crop in Pakistan and is also used as livestock fodder (Sugarcane-Wikipedia, the free encyclopedia).

Sugarcane is an important cash crop of Pakistan and plays an important role in the up lift of socioeconomic conditions of the growers. Rapid growth of sugar industry has contributed to economic development of the country. Sugarcane is the biggest source of revenue to the government because this crop fetches billions of rupees to the government in the form of duties and taxes. In recent industrial advancement sugarcane is not only Nazir et al 129 confined to sugar production, but its bi-products such as alcohol, chipboard, and dozens of others industrial chemical compound and can be manufactured during the sugarcane processing. Pakistan stands 5th position in terms of sugarcane production and 7th and 8th in terms of sugar production and consumption respectively in the world. Unfortunately, the country stands at a very low level of about 4 tone/ hectare. Currently sugarcane cultivation in Pakistan occupies 5% of the total cropped area and accounts for 17% of the gross value added by all crops. In Pakistan sugarcane is widely planted in Sindh, Punjab and NWFP provinces. The highest sugarcane production was recorded in Punjab with the average yield of 690mds/acre during the year 2007-08, while the lowest sugarcane yield was recorded for NWFP province with an average yield of 566mds/acre during the same year. The average yield of sugarcane during the last few years ranges between 45 to 50 ton/hectare. It is one of the poorest among 16 sugarcane producing countries as a major crop. The yield of sugarcane is quite low, 500-800 mds/acre, considerably less than the potential yields. The gap between potential and actual yield is very wide due to poor management practices and post-harvest losses. It is also found that sugarcane production system has passed down from previous generations and is dominant among the growers. The traditional methods are commonly used in sugarcane management and labor is an important input in the sugarcane production process. Production process is not mechanized and is mostly labor intensive. Majority of the growers do not follow modern practices like proper use of FYM, inter-culturing, fertilizer application, sprays and timely irrigation. The problems of post harvest losses include improper handling, harvesting and inadequate transport facilities. Therefore, this study was conducted to investigate the major factors affecting sugarcane production in Pakistan (Nazir et al. 2013). Girei and Giroh (2012) identified inadequate credit, the major constraint for sugarcane Yield and suggestion was given for the solution of that problem for uplifting sugarcane production. In present study also, inadequate credit was a major constraint for sugarcane production. The growers did not obtain the loan according to their requirements from the bank. This research also supports this theory and recommends more credit supply to farmer in the study area.

Khan et al. (2017) conducted study in the Department of Agricultural Extension, Education and Communication, University of Agriculture, Peshawar, Pakistan during the year 2015 to identify the main factors affecting sugarcane productivity. Two districts i.e. Mardan and Charsadda of Khyber Pakhtunkhwa province were selected for this research study. Moreover, a multi-stage sampling technique was applied for selection of the samples. Some 336 sugarcane growers were selected through a multi-stage sampling technique. Primary data were collected from these growers by a well-designed and pre-tested interview schedule. Results of study confirmed that educated, young, large size land-holders (6.88 to 8.50 ha) and share cropper growers recorded maximum average yields of 110, 69.07, 124.24 and 93.80 tons per hectare of sugarcane. Moreover, a few growers (cultivated area 6.88 -8.50 ha) achieved average yield upto 124.24 tons per hectare. Certainly, these growers have appropriate knowledge about productivity factors. Further, silt loam soil and fallow sowing method (mono-cropping) was associated with improved sugarcane productivity. The silt loam soil and fallow sowing method growers got maximum average yields of 75.52 and 83.17 tons per hectare. Similarly, the growers who had knowledge about the benefits of engaging with agricultural extension department and agricultural extension agents achieved average yields of 88.39 and 74.21 tons per hectare. In addition, the sugarcane growers who planted more productive varieties i.e. CPF 246, NCO 310, SPF 213, Mardan 93 and CP 77/400 obtained average yields of 112.18, 107.89, 85.00, 71.00 and 70.97 tons per hectare, respectively. It was concluded that educated growers were aware of suitable cultivating techniques, appropriate management, proper and timely inputs application and other required information.

Seeing to its importance the study was arranged to analyze different factors effects on sugarcane production in the study area

2. Material and Methods

The Universe of the study was district Mardan which consist of tehsil Mardan, Katlang and Thakht Bai. Total 105 sugarcane growers were selected from 260 credit owner of ZTBL. Through interview schedule data were collected from the respondents and analyzed with the help of Cob Douglass Production type and Quantile Regression. Equation is given below:-

$$\ln y_i = \ln \beta + \beta_1 \ln X_1 + \ln \beta_2 X_2 + \ln \beta_3 X_3 + \ln \beta_4 X_4 + \ln \beta_5 X_5 + \ln \beta_6 X_6 + \ln \beta_7 X_7 + \ln \beta_8 X_8 + \mu_i \quad 3.4$$

y_i = Per Hectare sugarcane Yield (kgs), β = Constant, X_1 = Land, X_2 = Plough, X_3 = Seed, X_4 = Fertilizer
 X_5 = Weedicides, X_6 = Labor days, X_7 = Irrigation, X_8 = Credit, $\beta_1 \dots \beta_8$ = Coefficients, μ_i = error term

3. Result and Discussion

Through Shapiro Wilk test the normality of the data were tested and found the dependent variable approximately normal, while the inputs data variables were found not normal. Through VIF test, the problem of multicollinearity was checked, while no problems of the collinearity were found among the independent variables. Heteroscedasticity problem was tested with scatter plot graph and found a little heteroscedasticity problem in the data, because of some assumption failure, both parametric and non parametric tests were applied, to fully analyzed the coefficient of independent variables and dependent variable. The data are given in tables 1 and 2

Table 1 indicates the Estimated Results of the Sugarcane per Hectare Yield (kg) of Cob Douglass Production Function of the Respondents in the Study area. According to the table, the un-standardized coefficients of land, plough, seeds, fertilizer, pesticides, labor days, irrigation and credit were estimated .037, -.066, .114, .063, -.012, 1.035 and .155 respectively. The plough, pesticides and credit coefficients were found non-significant, while the remaining were found highly significant. The plough and pesticides relationship with Yield of sugarcane was found inversely, while the remaining independent variables relation were found positive with the dependent variable sugarcane production. The R^2 value was found 0.804, which shows the explanatory power of the model, while the F-value was estimated 128.45 and p-value was .000 and shows the significance of overall independent variables in the model. The total output elasticity was estimated 1.608, which reflects the increasing return in scale and indicates that if one unit input is used for production, then 1.608 units output will be produced. Hussain *et al* (2011) had also applied Cob Douglass Production function type model for input and output analysis. The sum of all output elasticity was 1.9969, while in the present study was 1.608, in both situation the return was found in increasing return, but in the present research total output elasticity was found less than Hussain *et. al* (2011), due to unavoidable circumstances, such as white ants and other inputs applications variation. The white ants have destroyed the sugarcane crop of the majority respondents in the study area. Nazir *et al.* (2013) study was undertaken to identify the factors affecting sugarcane production in Pakistan. Data were collected from 387 sugarcane growers from Sindh, Punjab and NWFP province. Data were collected during the period 2007-08. The study reveals that the costs of inputs of sugarcane i.e. urea, DAP, FYM, land preparation, seed and its application, weeding and cost of irrigation were the important factors which influenced on the returns of sugarcane growers. The effectiveness was examined by using the Cobb-Douglas production function; MVP and allocative efficiency were calculated. The coefficient of multiple determinations R^2 was 0.9249, which indicated that 92% variation in the cost of inputs was explained by all explanatory variables and the adjusted R^2 was 92%. The F-value was 666.94 and was highly significant at 5% level of significance, indicating that the regression model was well fitted. The high prices of inputs, low price of output, delay in payments and lack of scientific knowledge were the major problems in sugarcane production. In order to enhance the productivity of sugarcane in the country, government should solve the identified problems to increase the income of sugarcane growers

Table 1 Estimated Results of the Sugarcane per Hectare Yield(kg) of Cob Douglass Production Function of the Respondents in the Study area

Model	Un-standardized Coefficients		t-value	Sig.
	B	Std Error		
Constant(β)	5.831	.448	13.021	.000
Land(X_1)	.037	.013	2.756	.006
Plough(X_2)	-.066	.057	-1.149	.252
Seeds(X_3)	.114	.043	2.666	.008
Fertilizer(X_4)	.063	.052	1.210	.227
Pesticides(X_5)	-.012	.031	-.378	.706
Labourdays(X_6)	.282	.057	4.978	.000
Irrigation(X_7)	1.035	.081	12.845	.000
Credit(X_8)	.155	.151	1.026	.306

Source:- Field Survey 2012, R^2 value=0.804, F-value=128.452, Elasticity= 1.608

Table 2 shows the Quintile regression coefficients, R^2 value total elasticity of sugarcane Yield per hectare in the study area. According to the table, the un-standardized coefficient constant value was 6.203, while land, plough, seeds, fertilizer, pesticides, labor days, irrigation and credit coefficients value were estimated 0.0103, 0.006, 0.186, 0.032, 0.32, 0.172, 0.923 and 0.058 respectively. All variables coefficients were found significant at .05 level and relation with Yield was found positive. If all variables, one percent input of each variables will be applied for production, then land, plough, seeds, fertilizer, pesticides, labor days, irrigation and credit will

take positive change 0.0103, 0.006, 0.186, 0.032, 0.32 0.172, 0.923 and 0.058 percents respectively, in the yield of the sugarcane. The R^2 value was estimated 0.66, which explain the power of the model and explain 66% variation of the independent variables in the production. The raw sum of deviations was 32.78 and minimum sum of deviations was 11.11, while the total elasticity of the output was 1.42, which shows the increasing return in scale. The elasticity of total output of parametric model was found more than the non-parametric model and reflects more increasing return scale than the non-parametric model. Due to heterodoscity problem the parametric model, misguided the result of the increasing return in the Cob Douglass production function. There the total output elasticity was also found less than the Hussain *et. al* (2011) study. So, there is a little difference between Hussain and the present study.

Table 2 Estimated Results of Nonparametric Quintile Regression per Hectare Yield (kg) of the Sugarcane of the Respondents in the Study Area

Model	B	Std Error	T	Sig	R^2
Constant	6.203	1.72	3.6	0.000	0.66
Land _(X1)	0.010	5.22	2.0	0.000	
Plough _(X2)	0.006	2.05	2.8	0.000	
Seeds _(X3)	0.186	1.63	1.1	0.000	
Fertilizer _(X4)	0.032	1.19	2.7	0.000	
Pesticides _(X5)	0.032	2.17	7.9	0.000	
.Labourdays _(X6)	0.172	5.90	9.8	0.000	
Irrigation _(X7)	0.923	2.88	2.0	0.000	
Credit _(X8)	0.058	5.90	9.8	0.00	

Source:- Field Survey 2012, Min sum of deviations 11.11, Total elasticity output value=1.42

Conclusion and Recommendations

The study finally concluded that inputs play key role in the enhancement of production and without inputs application good production is impossible. Both model proved that inputs have great relation with production of sugarcane while the farmers are very poor, so they can not afford the cost of the inputs and because of this in proper time they do not purchase inputs for their sugarcane crop and gain less production than the expected production of the sugarcane. The farmers have received the loan from the bank while loan were less than the requirement. Therefore it is recommended to the banker to facilitate the farmer according to their requirement. Loan is a that factor which push the other factor for enhancement of production. Similarly number of irrigation also affect the production of sugarcane because it need more water than the other crops and without water sugarcane production is impossible, so it is also requested to government of Pakistan to develop the irrigation system in the study area. Purity of seed also affect the production. Good variety of seed increase the production of sugarcane which give more benefit to the farmer. Marketing is also a great hurdle to sugarcane growers in the study area, some time production is more while the price is low and the farmer get less revenue than the expected return, So good marketing system is required for uplifting the production of sugarcane in the study area

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