Factors Affecting Agricultural Production: An Evidence From Sindh (Pakistan)

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ABSTRACT
This study investigates the key factors affecting agricultural production: an evidence from Sindh province of Pakistan over the period 1995-2011 with secondary data obtained from the Pakistan Statistical Year Book (various issues) and Economic Survey of Pakistan. The present study employed Cobb-Douglas production function to examine the effect of factors affecting on agricultural production of Sindh province. Agricultural production was explained by cropped area in (000 hectares), fertilizer consumption in (metric tons of plant nutrients), and government expenditure on agriculture in (Rs. million) and sugarcane support price in (Rs. /40 kg). The results show that cropped area, fertilizer consumption and sugarcane support price have positive and significant effect on agricultural production of Sindh province whereas the effect of government expenditure was found negative. Therefore, the study recommended that government of Sindh should accord high priority to these factors to increase agricultural production in the region.

KEYWORDS: Agricultural output, Government expenditure, Fertilizer consumption, Cobb-Douglas, Sindh

INTRODUCTION

The Sindh province once known as the granary of the southeast is the lifeline of Pakistan’s economy. Sindh province is mainly a dry region and is relatively more arid than the upcountry areas. Agriculture, industry and services these are the major sectors of the economy of Sindh province[1]. The economy of this province mainly based on agriculture, although industry makes a substantial contribution. The total area of Sindh Province is 140914 Sq.km and total population is 30.4 million as per 1998 census. Almost 14 million people lives in rural areas which are engaged directly or indirectly in farming activities for their livelihood[2]. Total reported area of Sindh province is 14.09 million hectares. Cultivated areas is 5.08 million hectares and uncultivated area is about 6.80 million hectares[2]. Sindh is the second largest province of Pakistan on the basis of its contribution to agriculture production of the country. There are two major seasons of growing different crops in Sindh province. First, Kharif season, in this season the major crops including Cotton, Rice, Sugarcane, Maize, Juwar, Mung and Bajra, in pulses like Arhar and Mooth, in vegetables such as Bitter guard, lady finger, Chillies, Tinda and in fruits including Mango, Dates, Mellon, Apricot are produced[1]. Second, Rabi season, in this season major crops are cultivated such as Wheat, Barly, Gram, in pulses like Massor, Mattar, in vegetables such as Cauliflower, Turnip, Carrot, Mattar, in fruits like Citrus, Guava and other fruits crops are produced in rabi season but oil seed crops such as Sunflower, Soybean, Maize are grown in both Kharif and Rabi season in the different zones of Sindh province[2]. Sindh province significantly contributes towards overall national agriculture production in major crops as 30.86% in cotton, 25.51% in rice, 24.89% in sugarcane and 17.01% in wheat. On the other hand in minor crops as 92.08 in chilies, 80.31% in banana, 44.42% in onion, 21.68% in tomato and 20.22% in...
mango[2]. Figure 1 to 7 indicates trend of total agricultural production in Sindh province of Pakistan (1995-2011) including food crops, cash crops, pulses, fruits and vegetables, provincial expenditure and fertilizer consumption.

**Fig. 1:** Food Crops includes Wheat, Rice and Maize  
Source: Pakistan Statistical Year books (various issues)

**Fig. 2:** Cash Crops includes Sugarcane and Cotton  
Source: Pakistan Statistical Year books (various issues)
Fig. 3: Pulses includes Gram, Mung, Mash, Masoor and Mattar, Vegetables includes all
Source: Pakistan Statistical Year books (various issues)

Fig. 4: Fruits includes Mango, Apple, Guava, Citrus and other fruits
Source: Pakistan Statistical Year books (various issues)
**Fig. 5:** Agricultural Production of all crops in Sindh Province of Pakistan
Source: Pakistan Statistical Yearbooks (various issues)

**Fig. 6:** Provincial Expenditure on Agri. Research and Irrigation
Source: Pakistan Statistical Yearbooks (various issues)
Presently agricultural productivity of this province is six times less than developed farming of the world. The agriculture sector of this province is confronting many challenges like declining water resources, slow process of mechanization, lack of subsidies on major inputs, poor governments policies, inadequate supply of major agricultural inputs, speedy land degradation, poor infrastructure, underdeveloped agriculture marketing, environmental, cultural hurdles, use of old agriculture technologies and less availability of credit. These challenges lead to instability in agriculture growth, affect rural development process and hamper socio economic development of the region[4,5,6,7,8]. However, low agricultural production has a negative influence on the economy of this region. Various factors have been identified to increase growth and development of this sector. These factors such as education and skills [9], Infrastructural facilities [10] and adequate funding [11, 12, 13].

Though the several factors affecting on agricultural production is well investigated but still there are not many recent studies on said subject in Sindh province of Pakistan. Therefore, the present study is timely and important.

**Study Objective:**

The aims of this research is to investigate the factors that affect agricultural production in Sindh Pakistan over the period of 1995 to 2011. The time period for this research is based on the availability of data.

**The Significance of the Study:**

This study will provide useful information of various factors affecting on agricultural production of Sindh Pakistan. The outcome of this study will also helpful for Sindh government of Pakistan, policy makers, scholars and students.

**Hypothesis:**

H0: Factors do not have any significant effect on agricultural production in Sindh Province of Pakistan.

**MATERIALS AND METHODS**

**Source of Data:**

In this study, secondary source of data was used to examine the factors affecting agricultural production in Sindh Province of Pakistan. The secondary data cover 17 years ranging from 1995 to 2011. The data was obtained from Pakistan Statistical Year Book (various issues) and the Agricultural Census.

**Empirical Model:**

In order to examine the factors affecting agricultural production in Sindh Province of Pakistan, the following empirical model is estimated:

\[ \ln(AGRP) = \ln(\beta_0) + \beta_1 \ln(CRPAREA) + \beta_2 \ln(FERC) + \beta_3 \ln(AGREXP) + \beta_4 \ln(SUGSPRICE) + \mu \]
Where,

Dependent Variable Ln (AGRP)

Dependent variable was Natural logarithm of Agricultural production in (000 tones) in the Sindh province of Pakistan. This dependent variable was collected by summing the year wise production of food crops like (Rice, Wheat and Maize), including production of all pulses, cash crops (Cotton and Sugarcane), all types of fruits and vegetables. Details of independent variables are given below.

Independent Variables

Ln (CRPAREA) = Natural logarithm of cropped area of Sindh province of Pakistan in (000 hectare)

Ln (FERC)= Natural logarithm of fertilizer consumption i.e. the sum of Potash (K), Phosphorus (P) and Nitrogen(N) of Fertilizer in (metric tons of plant nutrients)

Ln (AGREXP) = Natural logarithm of Provincial Expenditure on Agriculture Research and on Irrigation in (million rupees)

Ln (SUGSPRICE) = Natural logarithm of Sugarcane Support Price in (Rs. /40 Kg)

RESULTS AND DISCUSSION

The value of $R^2$ was 0.70 percent which shows that fitness of this model was good and 70 percent total variation in Agricultural Production were explained by four independent variables (Cropped Area, Fertilizer Consumption, Provincial Expenditure on Agriculture Research and Sugarcane Support Price). In the present study we have investigated the effect of several factors on agricultural production in Sindh Province of Pakistan. The results of regression analysis are reported in Table 2.

The results of estimated equation of the fitted model is:

$$
\text{Ln} (\text{AGRP}) = +12.76835
$$

$$
\text{Ln} (\text{CRPAREA}) = +0.826971
$$

$$
\text{Ln} (\text{FERC}) = -0.410906
$$

$$
\text{Ln} (\text{AGREXP}) = -0.131214
$$

$$
\text{Ln} (\text{SUGSPRICE}) = +0.291414
$$

<p>| Table 2: Regression results including the variables TAGP, CROPAREA, FERC, AGREXP and SUGSPRICE |</p>
<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>12.76835</td>
<td>1.238545</td>
<td>10.30915</td>
<td>0.000</td>
</tr>
<tr>
<td>Ln (CRPAREA)</td>
<td>0.826971</td>
<td>0.209265</td>
<td>3.951787</td>
<td>0.0019</td>
</tr>
<tr>
<td>Ln (FERC)</td>
<td>-0.410906</td>
<td>0.226608</td>
<td>-1.813288</td>
<td>0.0949</td>
</tr>
<tr>
<td>Ln (AGREXP)</td>
<td>-0.131214</td>
<td>0.085025</td>
<td>-1.543237</td>
<td>0.1487</td>
</tr>
<tr>
<td>Ln (SUGSPRICE)</td>
<td>0.291414</td>
<td>0.107621</td>
<td>2.707780</td>
<td>0.0190</td>
</tr>
</tbody>
</table>

R-squared = 0.704263 Adjusted R-squared = 0.605684

| F-statistic = 7.144160 Prob(F-statistic) = 0.003496 |
| Durbin-Watson stat = 2.397993 |

Source: Author's own calculation using Eviews 9.

The coefficient of the two independent variables (CRPAREA) and (SUGSPRICE) were positive and statistically significant at 1 percent of probability level. It indicates that these variables have positive relationship with total agricultural production. On the other hand, the coefficient of (FERC) and (AGREXP) were non-significant. It is evident that cropped area is highly significant and showing to increase the agricultural production in Sindh province. The land is an important and as a basic input indicates its coefficient 0.826971; this means 1% increase in cropped area agricultural production increased by 0.82 percent tones. The empirical results are inline with the results carried out in earlier studies by [14, 15, 16, 17]. They found positive relationship between cropped area and agricultural production. Similarly, empirical results explained that the coefficient of fertilizer consumption in (metric tons of plant nutrients) is 0.41 and has negative sign. The results are according to [17, 18]. They found insignificant relationship between fertilizer consumption and agricultural production. The elasticity coefficient of fertilizer (nutrients) consumption in Sindh province indicates that increase in fertilizer consumption results in decline of agricultural production. In fact the majority of growers of this region are illiterate and are not well trained in the application of fertilizers in terms of nutrients usage. This may lead to over doses of the nutrients at the cost of other important nutrients and hence negatively affect the agricultural production. The results further indicate that the coefficient of government expenditure on agricultural research and irrigation is 0.13 and has negative sign. The results are according to [18, 19]. They also found negative impact.
of public expenditure on agricultural production. This insufficient contribution of agricultural research and irrigation is due to less attention paid from the government side. The provincial government spending on agricultural research and irrigation is inadequate to meet the requirement of modern agriculture and make Sindh’s agriculture sector worldwide competitive.

Sugarcane support price have been used as proxy variable for price support programme of the government of Sindh province. The coefficient of sugarcane support price is 0.29 and is statistically significant at 0.01 percent level of significance. Estimation shows that sugarcane support price has positive and significant contribution and implies that 1 percent increase in sugarcane support price leads to an increase agricultural production by 0.29 percent tones.

The findings are in line with the one reported by [20]. They found out positive and significant effect on sugarcane production.

Conclusions and Recommendations:

This study examines factors affecting agricultural production of Sindh Province of Pakistan. Secondary data from 1995 to 2011 was used and Cobb Douglas production model was estimated. From the findings of the study it can be concluded that cropped area and sugarcane support price have a positive effect on agricultural production of Sindh province. On the other hand, fertilizer consumption and provincial government expenditure on agricultural research and irrigation have a no significant effect on agricultural production. Agriculture is backbone of Sindh province economy. In spite of it’s an important role, overall agricultural production of this province is consider very low as compare to Punjab province of Pakistan and there are many factors that contribute to this shortfall. On the basis of above, empirical findings the following recommendations can be derived to further enhance agriculture production of Sindh province.

1. The results of this study show that sugarcane support price have positively contributed in cumulative agricultural productivity of the Sindh. The programme of support price for sugarcane should be continued. Thus this support price can be boosted agricultural productivity of this province.

2. Fertilizer constitutes an essential component of cost of production of all types of crops. Therefore, government of Sindh province should ensure timely and proper availability of fertilizers at affordable rates to farming community also technical and advisory services should be arranged so that growers can effectively utilized required doses of fertilizers.

3. The effective monitoring agencies should be established by the government of Sindh province to ensure that the amount allocated to the agricultural sector is actually and judiciously spent. Also government expenditure should be further increased on agricultural research and spending on water courses.

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REFERENCES


