Research Article
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Assessment of comparative productivity and allocation efficiency inputs in barely farms of sistan region

Abstract

Econometrics method has been implemented through cobb-douglas production equation to obtain assessment comparative productivity and allocation efficiency inputs in barely farms of sistan region. Technical coefficients referred to the agricultural years, 2013-2014 from 280 barely farms of sistan region. The results indicate if the average cultivation level increased to 1% as maximum, production would have increased to 1.1%. Negative coefficients indicate, utilizing of water input known as uneconomic input. Also maximum and minimum average productivity assigned to cultivation level and water input respectively. Average productivity of cultivated level showed that mean of barely yield is 2365.35 kg/ha. Average productivity of inputs includes water, fertilizer and labor released that increasing one unit in each mentioned inputs increased 0.198, 7.73 and 485.11 (kg) for barely production. Marginal productivity of fertilizer and labor obtained 0.108 and 28.564. Furthermore criterions of $VMPX_i/PX_i$ show that water consumption placed in uneconomic area and other inputs would have used less than optimum. Total productivity was equal to 4.65 kg. Under cultivated area, water, labor and fertilizer have significant effect on barely yield.

Keywords: sistan area, barely, allocation efficiency

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Introduction

Deficit of sources and productivity is one of the important limited factors in agricultural.[1] Al through before decade had was various ways for increase production of agricultural products such as increase under cultivation level, but limitations such unavailable suitable land for cultivation, investment, water and other factor cause pay attention more on use from methods increment productivity production factor. The 90 % increase of agriculture production is cause improve productivity of production factor. Therefore require to scientific study on productivity of agriculture production factor.[2] Investigation for economic review of application of factors in production of cotton in garmsar city from estimated of transcendental production function. Result had showed that farmers with under cultivation area rather perform economic usually in consumption factor while consumption of often production factor was in third of production.[3] In review of productivity and allocation of grape production factor in sistan province there used from third degree and several sentences of production function. Result was indicated that 47 % of gardener that used water more than optimum. And 95, 56 and 43 % from garden and whole there respectively in use of poison, nitrogen fertilizer, phosphor fertilizer and land was less than optimum.[4] study of expensive operation agriculture research and broad casting in American with use of cobb-douglas equation for final evaluation of sowed operation were get result that research and broad casting is cause of increasing operation output factors.[5] Study of operation factors for barely production with use of production equation in penjab showed 1% increase in number educated person and in area cultivation because respectively1.23 and 0.437 percent increase in agriculture operation.[6]

Iran's rainfall volume comprises just 0.37% of all rainfall from the earth's lands and 1.29% of rainfall volume in Asia. Also, the average annual evaporation in Iran is estimated at about 70-71% of annual rainfall. In this regard, just Africa and Australia, with 70% and 80% evaporation under undesirable rainfall conditions, respectively, are lower than Iran.[7] the Sistan region had a hot and dry climate. Based on different calculation methods, its average annual temperature was 21°C, its annual rainfall was 61.4mm, its relative humidity was 38%, and its potential evapotranspiration was 4196mm.[8] Of the total cultivated lands of the country, an area of 12 million hectares is located in Sistan and Baluchistan out of which 52.4% is located in the Sistan region.[9] The purpose of this study was to estimate Assessment of comparative productivity and allocation efficiency inputs in barely farms of sistan region. With attention of self sufficiency of barely was need yesterday, and will had tomorrow development therefore achieve to this aim there are two ways: Increase of cultivation area or increase of yield in unit of area. Statistics is showed in sistan region under cultivation in year 2013-2014 for barely was 298610 hectare in irrigated cultivation. Also statistics show that Barely yield in farm condition was low than research condition. Such as research yield is 8T/ ha and farm yield is 2T/ha.

Materials and methods

There are two manners for calculating of productivity. First econometrics method and second non parametric. In econometrics method productivity will be estimated by two equations of production and cost. Second method is method criterion of productivity determination with use of mathematical planning or calculating of index number.[4] In this study has been used from econometrics method and have to bring review productivity and optimum allocation of production factors in barely cultivation with estimation of production function, while that have calculated with total factor productivity index by use from non parametric method. Results showed that cobb-douglas production equation is better. Therefore introduce total form of cobb-douglas function to below:

The logarithm form of mention function expression to below

$$\log Y = \log A + \sum_{i=1}^{n} \beta_i \log x_i$$

That in mention relation Y is total amount of output, X amount of input used in process of output A and B is function coefficient. In more economic study usually have rested calculated two types of productivity, partial productivity and total productivity.

Average production is mean of output that calculated by follow equation.

$$AP = Y / X_i$$

Marginal productivity is showed change in total production lieu to change one unit of input. Another word marginal productivity expression amount of change in total output in live change in one unit of factor used

$$MP_i = dY / dX_i$$

In order to determine of circumstance allocative of production factor use of concept value of marginal productivity each of factor.

$$VMP_i = py.MP_i$$

In high relation, PY target price of production if value of marginal productivity on factor equal to price.

In this case amount of consumption factor (with assumption competitive market) will be optimum limitation. If value of marginal productivity of factor equal to value of that factor exception to this is that factor allocation to set desired limit and another word that allocation efficiency equal to 100% and circumstance an allocation optimum of factor production decrease that productivity. If value of marginal productivity of variable input larger than this price

$$VMPx_i > Px_i$$

In this case allocation of factor wasn't efficiency. Therefore must use of more units from variable input in production product. Conversely allocation efficiency using of factor is better decrease consumption of factor.

We cannot measure reality of production unit by partially productivity of production factors. Therefore use from criterion total productivity of factor production for assessment operation of units production. Total factor production (TFP) definition to face ration of index quantity of output to index quantity of factors (Homauonifar and Rastgaripour, 2011). For calculating of total productivity with attention to different units of factors and also……..Also for access to total productivity of factor in production unit has been used from of kendrik index.[10]

$$TFP_i = Y_i / \sum_{i=1}^{m} S_j X_{ji}$$

TFP_i: index of total productivity of i^{th} production unit

Y_i: amount of total output obtain in i^{th} production unit

SS: average shear of cost factor in total costs of units

X_{ji}: amount of factor in j^{th} unit production

Data in this study has collected by design and complete questionnaire from farmers in sistan 2013-2014. Sample with use from kocran equation was used from 280 operation and sampling with two stage random method.

Results and discussion

More than 60 % barely production of sistan and Baluchistan province is belonged to sistan. Table 1 summarizes information about cultivation level of sistan region in 1996-2014 years. 30% of farmers in year 1996 had cultivated area about 5-10 hector. In year 2006 this cultivated area were allocated to 20% of farmers and this cultivated area in year 2014 had reach to 16% of farmers. Also in year 1996 cultivated area about 10-15 hector were allocated to 26% of farmers and this cultivated area in year 2006 were allocated to 13% of farmers and in year 2014 were allocated to 11% of farmers. These statistics as well as indicated to the decrease cultivated area. Table 2 indicated summarizes information about Comparison of Status crops in 1996-2014 years. According to this table 50% of farmers in year1996 were allocated their land to barely cultivation while in year 2006 cultivation this crop face to 60% reduction Compared to the1996 year. Generally, the result from estimate of cubb-douglas production function display in Table 3. Coefficient in production function is production elasticity. As coefficient of area under cultivation show if under cultivation area in unit barely in this study so that average one percentage increase, production increasing equal to 1/1 percentage. The negative coefficient of water factor statement this is that uses from this factor in region an economic. Coefficients obtain for fertilizer and labor show the former barely use of this two factor in two regions economic that is logical region.

Table 1 Cultivation level of sistan region in 1996-2014 years

Cultivation level	Absolute frequency			Relative frequency			Relative frequency%			Cumulative frequency		
	1996	2006	2014	1996	2006	2014	1996	2006	2014	1996	2006	2014
10-May	15	10	3	0.3	0.2	0.38	16%	20%	38%	15	10	3
15-Oct	13	10	2	0.26	0.13	0.33	11%	20%	33%	28	20	36
15-20	10	6	1	0.2	0.12	0.16	5%	12%	16%	38	26	8
Abov 20	12	4	1	0.24	0.08	0.11	5%	8%	11%	50	30	96

Table 2 Comparison of Status crops in 1996-2014 years

Crop	Absolute frequency			Relative frequency			Relative frequency%			Cumulative frequency		
	1996	2006	2014	1996	2006	2014	1996	2006	2014	1996	2006	2014
Barely	25	15	12	0.5	0.3	0.2	50%	30%	20%	25	15	12

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Table 3 Estimate of cubb-douglas production function

Variable	Coefficient	Std.Error	Significant
Fix coefficient	9.195	1.046	0
Under cultivation area(hector)	1.101	0.118	0
Water(m3)	-0.179	0.112	0.109
Fertilizer(kg)	0.014	0.007	0.056
labor	0.059	0.021	0.006
AR(1)	0.194	0.059	0.001

Source: obtained investigation

$R^2 = 0.96 \quad D.W = 2.07 \quad \overline{R} = 0.95$

Significant F was in level less than one percent statement this is that in sum model is significant. R^2 adjustment show that, 5 percentage form change of barely accounting in units case of examination with use from explanatory variables current in model. With perform azmoons appear that mode haven't difficult from point of view collineavity, and heteroscedasticity difficult of auto–correlation model removed after distinction. Exactly DW amareh is 2.077. Average and marginal productivity with use from relations (3) and (4) calculated for all factors and introduce those results in 3 schedules. Just as observation in 4 schedules, maximum and minimum productivity related to under cultivation area and water. Average productivity of under cultivation area had showed that on the average (middingly) in live of one hectare under cultivation production 35.2365 produce. Thus average productivity of factors: water, fertilizer and labor has showed that in live off on (m^3) water, one kg fertilizer and each labor to average 485.11, 7073, 128% kg obtain barely produce. Thus result showed that maximum marginal productivity relation to laud factor and equal to, 4.21 (Table 4). There for in live of increase on hectare under cultivation area increasing barely produce equal to, 4121. Negative marginal productivity of water expresses that farmer's barely in area in use of this factor are in uneconomic area. Marginal productivity of fertilizer and labor is 0/10 and 28.5. Also one unit extra of this inputs respectively make to increasing in production to amount 0.108 and 28.5 kg. Criterion $VMPx_i/px_i$ had showed that consumption water was in uneconomic area and another input used less than optimum. Thus should consumption this factor by farmers increase until come to optimum limitation.

Table 4 Average and marginal productivity

Factor	Average productivity	Marginal productivity
Under cultivation area(hector)	2365.35	2604.21
Water(m^3)	0.198	-0.035
Fertilizer(kg)	7.73	0.108
Labor	485.11	28.564

Conclusion

Search of economic behavior of barely producers in the region Sistan through estimation production function showed that the most efficacious factors in barely production is surface under cultivation, water level, fertilizers and labor so that if surface under cultivation increase a percentage equivalent of production will increase rate to 1.1 %. Negative coefficient of water input indicates that this input used in non-economic area. The most and least average productivity depended to inputs surface under cultivation and water. Also the results show that the most marginal productivity related to the land input and is equivalent to 21. 2604. Thus to increase per hectare surface under cultivation is added rate to equal to 21.2604 kg to barely product. In addition, VMPxi/pxi had showed that consumption water was in uneconomic area and another input used less than optimum. Therefore, the equivalent total productivity advantage 65.4 means that per a using total input unit (total building by) produce in region farms on the average 65.4 kg barely production.

Suggestions

Considering the results of this study, are will be offered, several recommendations, mostly derived from results of analysis:

a) Considering that surface under cultivation has the most tension between the production factors therefore suggested that is interest rates to increase productivity right solution used in this context that appears to consider inheritance law reform the consolidation of lands creating cooperative in order to increase the surface under cultivation appropriate.

b) Review in about efficient allocation factors suggests non-economic consumption of water. Therefore suggested to the education and awareness to the farmers in this area and create proper platforms for efficiency savings in water consumption as regular network of irrigation and drainage and clearing of lands that enhance water use efficiency water consumption brings to the optimum level.

c) Amounts of using fertilizer and work force input show that farmers in area use of this input in the production economic region but different from optimum level. Therefore for gain maximum benefit, it is necessary that shall be changed amount of use above inputs.

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Conflicts of interest

The authors declared there is no conflict of interest.

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