Variance Analysis On Vegetable Farming Of Malepatan, Pokhara: An Application Of Dummy Variable Approacch

Shyamananda Pandeya[*]
Lekha Nath Bhattarai[**]

INTRODUCTION

Agriculture sector has occupied a dominant position in Nepalese economy. It is evident from the fact that this sector alone contributes almost half to the gross domestic product and provides employment to about 80 percent of the working population. From the point of view of promoting exports, substituting imports, rising family income and providing resources to government and private industrial sector, too, its role is not negligible. Considering this reality, a huge amount of resources has been injected with due emphasis on the same sector during the various plan periods. But the improvement achieved so far is not satisfactory, in some cases it is rather disappointing. Traditional mode of farming has not yet transformed into diversified and commercialised farming system. Consequently, the rate of increment in productivity has remained at a low level. Increase in output, hence, may be attributed to the extension of land under cultivation. Due to the geo-climatic structure and environmental consideration, increase in agricultural output through the extension of land is neither possible nor permitable. The only way is to increase productivity through rational choices of appropriate technology and high yielding crops. In this regard, for Nepal, diversified and mixed farming system can be regarded as a logical intermediate step in the transition from subsistence to specialised commercial production in which the staple crops no longer dominates farm output, instead, new cash crops such as vegetables fruits etc. are established.

Vegetable farming is an emerging sub-sector of Nepalese agriculture, comprising about 5 percent (146503 ha.) of the total cultivated land in the country. During the last six years area under cultivation, production and yield (kg/ha.) has been found increasing but in a dissimilar way (VDD/ASD/HMG1997). In recent years, the production of fresh vegetable has been practiced in various places of the

* Mr. Pandeya is Lecturer in Prithwi Narayan Campus., Tribhuvan University. Pokhara.
* Mr. Bhattarai is Lecturer in Prithwi Narayan Campus, Tribhuvan University. Pokkhara.

country. Specially, farmers living along the highways and around the vicinity of towns and cities have shifted their farming activities, to some extent, towards the production of vegetables due to the attraction of increasing demand and profitability. The rising trends of urbanisation and commercial thinking also have put positive impact on it. It is also witnessed in case of Pokhara. Establishment of horiticulture farm in Malepatan and Lumle Agricultural Research Centre has made positive impact on development of vegetable farming in Pokhara and its periphery. The available data reveal that total area under vegetable cropping in Kaski district was 2001 ha. and production and yield was 21014 mt. and 10502 kg/ha. respectively in 1996 and 97 (VDD 1997). Pokhara and its vicinity have been developing as a major vegetable growing area in Kaski district.

CONCEPTUAL FRAMEWORK

Regarding farm size and productivity relation, there has been a continuous debate among the researchers. Some are of the view that productivity and farm size are positively correlated while others having just opposite view (Tiwari 1981; Neupane 1990). However, productivity may not only be determined by farm size alone but by other factors such as capital, labour use pattern and level of gechnology. In backward society like Nepal, land can be regarded as important and major forms of assets and status as well. Hence it is the land in case of farmers that determine the amount of resources used and innovations carried on in agriculture sector. With these assumptions in view, this study attempts to examine the variations in productivity, cost and profitability of vegetable crops due to farm size.

In varience analysis, various statistical methods and tools have been in use, dummy variable method is one among them, which is used in this study.

OBJECTIVES AND METHODOLOGY

The main objective of this study is to examine the farm-sizewise variations in costs, yields and profits of vegetable farming in Malepatan, Pokhara, applying dummy variable model.

This article is based on the research carried out in 1998. The study was a case study of vegetable farming in Malepatan, Pokhara. Out of 500 households engaged in vegetable farming, 10 percent were randomly selected for survey. Pre-tested structured questionnaire was administered and filled through direct interview with sample households' heads to collect the information required for the study.

For the convenience and uniformity, the collected quantities of costs and yields were converted into monetary value mutiplying respective prices prevailed during the month of July 1998 in the study area.

The sample households were classified into four groups (marginal, small, medium and large) according to the area of land under vegetable cultivation. The classification was based on researchers' own judgement. Farm size groups and numbers of sampled households are presented in Table 1.

Table 1
Numbers Of Sample Households By Farm Size

Farms Size (in Ropani)	Group	Number of Sample Household	Percent
Less than 1	Marginal	7	14
1-3	Small	22	44
3-6	Medium	17	34
6 and Above	Large	4	8
	Total	50	100

Source: Field Survey by the Authors, 1998.

As stated above the major findings of this study were based on the regression results. Where in costs, yields and differences of them profit, were treated as dependent variables and the dummies independent ones (Gujarati 1988). The cost figures include both variable and fixed costs. Human labour, bullocks, sprayer use, manure, chemical fertilizers pesticides, interest and seeds were included in variable costs whereas rent, land tax, wear and tear of farm equipment comprises fixed costs. Value of vegetable output per ropani inclusive of byproduct were considered as yields and difference between yields and costs (Y_i-C_i) being the profit. The models used were as follows:

Model I:

$$C_i = \alpha + \sum_{i=2}^{4} \beta_i D_i + u_i \quad\text{............... (i)}$$

Model II:

$$Y_i = \emptyset + \sum_{i=2}^{4} \gamma_i D_i + u_i \quad\text{............... (ii)}$$

Model III:

$$\Pi_i = \varphi + \sum_{i=2}^{4} \rho_i D_i + u_i \quad\text{............... (iii)}$$

Where,

C_i = Cost per Ropani i^{th} Households.

Y_i = Yield of ith Households.

Π_i = Profit of ith Households.

D_i = Dummy variables of ith category the value 1 for i^{th} category and o otherwise. For four categories (farm groups), three dummies (D_1, D_2, D_3) suffice, group marginal the base group.

α, φ and ϕ are the intercept terms representing the mean values of cost, yield and profit of the base group. and are the β_i, γ_i and and ρ_i are the coefficients of respective dummies of cost, yield and profit functions respectively and

u_i, the disturbance term satisfying all the assumptions of Ordinary Least Squares methods.

Similarly, the difference in the mean values of costs, yields and profits of differents groups from that of marginal (base) group are evaluated on the basis of significance tests of the asociated respective coefficients of the dummies.

FINDINGS AND DISCUSSION

Variations in Costs

To obtain the mean cost and analyse variations in them for different farm size groups, a regression of costs on the dummy variables D_{2i}, D_{3i}, and D_{4i} has been run by using OLS method. The regression results are as follows:

C_i =   13822.43 -3899.02D_{2i} -2708.9D_{3i} -2400.68 D_{4i}

SE :   1519.4971   1573.510   2194.71

t-ratio: 2.5657   1.7226   1.0938

R^2:   0.12719

Since, the explanatiory variables of the model are dummy variables, the intercept term represent the mean cost of vegetables for the base group which is estimated as Rs. 13822.43. The mean cost of other groups can be obtained by adding the mean cost of base group with the coefficient of dummies of respective groups. Following this rule, the mean cost of small, medium and large groups have been found to be Rs. 9923.41 Rs. 11113.53 and Rs. 11421.75 respectively.

The coefficient of D_2 is significant at 5 percent significance level showing significant difference between the mean cost of marginal group and that of small group. The coefficients of other dummies are not significant at this level. However, the coefficient of D_3 is found significant

at 10 percent level of significate. Hevce, the mean costs of medium and large groups do not differ from that of marginal group significantly.

From the point of view of cost, small size group is found most efficient one. The low value of R^2, however, indicates that the farm is not very remarkable factor to the variations in cost of vegetable farming.

Variations in Yields

With regards to yields the estimated regression results are as follows:

$$Y_i = 31629.14 - 5468.1D_{2i} + 1896.86D_{3i} + 22030.11D_{4i}$$

SE :	5654.640	5851.921	8167.397
t-ratio:	0.967	0.324	2.697
R^2:	0.254		

Following the rule as stated in cost function, the mean yields of marginal, small, medium, and large groups turn out to be Rs. 31629.14, Rs. 26161.04, Rs. 33525.99 and Rs. 53659.25 respectively. Only the coefficient of D_4 is found to be significant revealing significant difference between the mean yield of base group and that of large group; whereas, the differences between the yields of marginal group and other two groups are found to be insignificant at 5 percent level of significance. The dummies as shown by the value of R^2 explain about 25 percent variation in yields.

Variations in Profits

To explain the variation in profit (Y_i-C_i), the following regresion results have been considered. The results are :

$$P_i = 17807.71 - 1569.08D_{2i} + 4605.76D_{3i} + 24430.79D_{4i}$$

SE :	5334.376	5530.583	7704.816
T-ratio:	0.294	0.834	3.171
R^2 :	0.527		

From the above results, it is clear that the mean profit of marginal group is Rs. 17806.71, those of small, medium, and large groups are Rs. 16237.63, Rs. 22412.47 and Rs. 42237.50 respectively. The mean profit of large farm size is significantly different from that of marginal group at 5 percent level of significance but the profit of the rest are not significantly different at that level of significance.

CONCLUSION

From the discussion the results of above regression models it can be concluded that farm size has very limited influence on the costs yields and

profits of the vegetable farming in the studied area. However, profit goes on increasing, though in dissimilar ways, as the increase in farm size. It may be due to the inefficient use of inputs by the farmers with sufficient land while the farmers with smaller holdings are reluctant to use optimum combination of inputs. For smaller farmers, it is the labour that they can easily use while lacking other necessary inputs such as capital and technical knowledge etc.

With regards to the explanatory power of the model, the analysis of variance model (model containing exclusively dummy variables as explanatory variables) seems to possess very low as indicated by R^2 values in this study. It is, therefore, suggested to use analysis of co-variance models to cover the influence of other intervening variables including farm size.

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