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Estimation of Benefit Cost Ratio and Labor Requirement of Major Field Crops, Nepal

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ABSTRACT

Economic analysis is the major aspect of measurement of efficiency of a farm. In most cases, this part is lagging in Nepalese farmers. With the objective to find benefit cost ratio growing different crops, identify profitable crops and estimate labor requirement for cultivation, this case study was performed. The scope of this research is that it helps farmers in selecting the crop comparing the profit and labor available. This study was done as a case study in kavre district, Nepal. From this research, onion (B: C=1.95) and potato (B: C=2.44) were found the most profitable crops and wheat and maize the least. Labor requirement for onion was highest 643 men/ha and wheat was the lowest *i.e.* 142 men/ha.

1. Introduction

Economic analysis is simply the analysis of cash flow to and from the farm. It includes estimation of cost incurred during cultivation and the monetary output we obtain from our harvest. In mathematical term, profit or loss is expressed as Benefit Cost ratio (B: C) which is the ratio of gross return to total cost of cultivation (Adhikari, 2011). In agriculture, crops and cropping practice with B: C higher than 1.5 is regarded as profitable. Those crops which are a part of everyday meal or occupy an important part in socio-economic life of farmers are termed as major crops. Ecologically Nepal consists of three major division *viz*. terai, mid hills and high hills. Kavre is one of the districts of mid hills. The major crops grown, cultivation practices, livestock reared *etc.* varies with the ecological zones. Terai is considered as the grain basket of the country as it harvests most of the countries staple food. In terai, valley and low hills rice followed by maize and wheat are the major cereal crops (NARC, 2010). In mid and higher hills cropping pattern is mainly dominated by maize (Tripathi and Jones 2010). The area cultivated under paddy, maize and wheat shows that paddy is the most important food crop in terms of area coverage followed by maize and wheat. Similarly, the productivity of paddy is highest among these three cereals. (MOAD 2014/15).

Combination of livestock, forest and crop is typical in Nepalese agriculture system (Tripathi and Jones, 2010). Due to topographical disadvantage traditional methods of agricultural practices and animal power are still major in the hills and high hills but in Terai mechanization is seen (Shrestha 2012).

The importance of agriculture sector and its overall development is directly linked with the objectives of meeting basic needs of the people (MOAD, 2014/15). Increasing farm production and farmers' income is primarily dependent on farm planning (MOAD, 2014/15). 65.7% of population is dependent on agriculture for livelihood and 60% of these farmers are subsistence farmers because of small land holding (Karki MoAD 2015). Due to higher competition and agri-business challenges (Ghimire, 2008) credit and labor deficiency (Maharjan *et al.,* 2013) return to small land holding farmers is decreasing. Economic analysis of farming system will help them and the concerned development facilitators to make proper decisions required for further improvement (MOAD, 2014/15). It helps in determination of successfulness and sustainability of a farm and farming practices.

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Farmers of Nepal are mostly illiterate and are farming in rural context with very less extent of mechanization (Ghimire, 2008) and Farms lack proper planning which is one of the major reason for lower return to the farm family and foreign employment of youths. Majority of farmers of pathlekhet VDC don't know the economic situation of their cropping pattern and practice. The major objective of this study is to find the benefit cost ratio, unit cost of production of different crops grown in pathlekhet VDC. This study also aims to find the most profitable crop and to estimate the labor requirement for growing different crops. This study will help farmers and developmental organization involved to plan their farming pattern according to the economic status and labor availability as labor and economics are the two of the major factors responsible for crop production.

2. Methodology of Study

This study was conducted as a case study. This case study involved site selection, data collection, literature review, data analysis *etc*.

2.1 Site Selection

Pathlekhet VDC (Ward no 1, 3, 4), Pankhal municipality (Ward no. 11, 13) and Kasikhanda municipality (Ward no. 6, 3) of Kavre district were selected as the site for the study. Pathlekhet is 41KM and Kasikhanda municipality is 51Km east of Kathmandu in BP highway and Pankhal lies 20Km from Dhulikhel on Araniko highway. Pathlekhet is at 1100 to 1400 masl, Pankhal is at 700-1100 and Kasikhanda is a bit lower *i.e.* 950-1200masl. Farmers with average land holdings of about 0.3-0.5 Ha (Survey result) are dominant in the district. Major occupation of most of the people (>80%) being agriculture, it occupies an important position in social and economic life. Being in hilly area, mechanization is very poor (Kasikhanda and Pankhal little more mechanized than pathlekhet). In pathlekhet, sill animal are the major draft power. Few mini tillers/power tillers are seen in the fields with road access. For intercultural operations like weeding, irrigation harvesting, threshing manual labor is the only power to depend on. In some family paddle thresher is seen but farmers don't prefer paddle thresher as the quality of straw is low. About 90% of the fields are rain fed and remaining 10% is irrigated. Due to low mechanization and transport facility, cost of production seems higher as compared to mechanized part of the country.

2.2 Data Collection

The method applied for the collection of data was questionnaire survey with local farmers growing different crops and key informants of the VDC. The data collected was primarily quantitative by using standard open ended questionnaire. Cost was calculated as a function of labor, manure, fertilizer, machinery/tools, food and other inputs and income was estimated by calculating the market value of economic yield *i.e.* grain and straw in rice and wheat, grain in maize and mustard, bulb in onion and tuber in potato. Pretesting was done with 5 respondents of pathlekhet VDC. A total of 30 respondents were interviewed. Respondents were selected at random.

2.3 Data Analysis

All the cost and income was 1st calculated per ropani as it is the popular unit of measurement in kavre district. Later, cost and income was converted to per hectare (International unit) for easy understanding. Ms-excel and Ms-word were used for the analysis of these data.

3. Result

The result of the study is presented below.

3.1 Major crops and cropping pattern

Pathelekhet VDC has both low land and upland. Lowland is termed as khet land and upland as bari land. Difference in cropping patter in khet land and Bari land is common. In khet land farmers practice rice based cropping pattern where most of the farmers grow 2 season rice, rainy and spring. Apart from rice, maize, wheat, potato, onion is popular. While in Bari land there is maize based cropping pattern. In bari wheat, mustard, potato and vegetables are grown along with maize. Large scale vegetables are mostly grown by commercial farmers. Important and commonly grown vegetables includes cabbage, cauliflower, Eggplant, capsicum, potato, garlic, onion, bitter guard, sponge guard *etc.*

Table 1. Major crops grown in village as per the % of farmers involved. (Very small scale *i.e.* kitchen garden, backyard garden aren't considered).

S.N.	Crop	% of farmers involved
1.	Rice	95%
2.	Maize	100%
3.	Wheat	60%
4.	Onion	70%
5.	Mustard	60%
6.	Potato	98%

In terms of number of farmers involved, maize occupies the 1st position. It is so as maize can be grown in both khet and bari land. For rice, about 5% farmers only have bari land and have no area suitable for rice. In case of wheat, as potato harbors more return per unit area (Table 2) and growing season of wheat and potato overlap in khet land, more farmers are involved in potato than wheat. Also because of harvesting and threshing difficulty in wheat, farmers tend to grow other crop instead of wheat. Onion requires more labor per unit area (Table 4). Because of high labor requirement, onion is cultivated by fewer farmers than other crops. For mustard, because of low productivity and farmers prioritizing for staple crops, only farmers with bigger land holding tend to grow mustard. Study shows that, potato and onion are the most profitable crop followed by mustard, rice, wheat and maize. Even though rice wheat and maize are less profitable, rice followed by wheat and maize are the crops grown by majority of farmers as it is the staple food. In case of rice transplanting, weeding and harvesting cover the major fraction (50-60%) of the total cost. Use of transplanters, weeding and harvesting machines might be a way to increase B: C of rice. Similarly, in maize fertilizer covers the major fraction of cost (30-40%) and Stover of maize doesn't give any return. Use of improved variety can help to enhance B: C of maize.

Table 2. Cost of production and value of output, Benefit: Cost and variance between respondents of Rice, Maize, Wheat, Onion, Mustard and Potato of Pathlekhet VDC of Kavre district, 2015 A.D
(In case of rice and wheat, both grain and straw are considered)

Sl. No.	Crop	Average Cost per Hectare (NRs.)	Average Income per Hectare (NRs)	Benefit : Cost (B:C)			Coefficient of variation (In cost)
				Min	Max	Average	
1	Rice	162380.00	185746.00	1.0493	1.723	1.1439	20.19%
2	Maize	114623.20	106250.00	0.8	1.035	0.9269	21.32%
4	Wheat	59268.00	72811.42	0.92	1.554	1.228	14.54%
3	Onion	390613.00	762000.00	1.02	2.22	1.9507	18.46%
5	Mustard	44997.00	68294.00	1.182	1.960	1.5177	10.61%
6	Potato	243846.6	562983.2	1.49	3.29	2.44	32.20%

Table 3. Unit cost of production and market value of output of Rice, Maize, Wheat, Onion, Potato of Pathlekhet VDC of Kavre district, 2015 A.D
(In case of rice and wheat only grains is considered)

Crop	Unit cost of production Cost/Kg (NRs)			Market value of output Price/Kg (NRs)
	Min	Max	Average	
Rice	30.94	45.94	36.84	35-45
Maize	24.21	31.22	27.27	27-32
Wheat	23.87	53.63	40.61	24-26
Onion	20.97	31.32	25.09	60-130
Mustard	17.62	45.07	32.38	55-60
Potato	9.47	22.1	14.4	20-40

Table 4. Average labor requirement for cultivation of crops under study in ha and variance between respondents.

Sl. No.	Crop	No. of labor/Ha	Variance between respondents
1)	Rice	360	12.59%
2)	Maize	173	12.75%
3)	Potato	210	11.09%
4)	Onion	643	10.37%
5)	Wheat	142	26.94
6)	Mustard	256	12.27%

Conclusion

Thus the data reveals that onion and potato are the most profitable crop in a normal situation. But requirement of high labor is decreasing the involvement of the farmers. Rice is also profitable but the percentage of profit is less. But still, as this is the major staple food and has cultural importance, it is still worthwhile to grow. But regarding maize, we must think some improvement in terms of variety or the cultivation practices like incorporation of legumes (Soybean), mixed cropping *etc*. to make it more profitable. In wheat, considering only grains, it's not profitable but as the straw is a good food for animals, it also has a good market value. And in mustard also, the plant can be used as compost preparation and also as animal feed.

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