RESEARCH ARTICLE

A REGRESSION ANALYSIS ON MARKETED SURPLUS OF CABBAGE IN MOKOKCHUNG AND WOKHA DISTRICTS OF NAGALAND

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ABSTRACT

Longkhum and Soku villages under Mokokchung and Wokha districts of Nagaland is purposively selected in the present study to estimate the marketable and marketed surplus of cabbage, and regressed the factors determining marketed surplus in the two districts of Nagaland. The study found out that average production of cabbage is higher in Longkhum village thus percentage of marketed surplus is 86.38%; while the actual quantity marketed in Soku village is concluded to be 66.49% comparatively lower than their counterpart village. This is mostly due to their high retention purpose and post-harvest loss. Further, regression results with and without dummy variables reveal production the prominent factor for increase marketed surplus in both the districts of Nagaland.

INTRODUCTION

Mokokchung district covers an area of 1,615 sq. km lies between 94.29 and 94.76 degrees longitude and 26.20 and 26.77 degrees latitude located at an elevation of 1,326 meters above sea level. It is bounded by Assam to its North, Wokha and Assam to its West, Tuensang to its East, and Zunheboto to its South. The total population (2011 census) of the district is 194,622 of which male constitute 51.94% and female 48.06%. The literacy rate of the district is 91.6% with male having higher percentage of literates than the female. While Wokha district covering an area of 1,628 sq. km is at an elevation of 1,314 above sea level lies between Latitudes 26°01' and 26°08' N and Longitudes 94°18' and 94°27' E. It is bounded by Assam to its North and West, Mokokchung and Zunheboto to its East, Kohima to its South. As per 2011 census, the total population of the district is 166,343 of male 50.80% and female 49.20%. and literacy rate of 87.7% with male 90.8% and female 84.5%. Marketable surplus plays a significant role since it determines the pace of economic development; therefore, an increase in production must be followed by increase in marketable surplus for economic development of the country. Unlike subsistence crops, fruits and vegetable are mostly marketable because of its perishable nature. Marketable surplus is the quantity that is actually made available to the non-farm sectors of the economy after meeting farms requirement for family consumption, needs for seeds and feeds, payment in kind or gift to labours, artisans, carpenters, blacksmith, mechanics, landlords and other social and religious payments. Whereas, marketed surplus is the quantity that is actually made available for sell in the market by the producers/farmers irrespective of his requirements for family consumption, farm needs and feeds, and all other payments in kind. The relationship between marketed surplus and marketable surplus may be more, less or even equal depending upon the nature of the crops. However, marketed surplus is equal to marketable surplus for perishable commodities.

Objective

1. To determine marketable and marketed surplus of cabbage in the two districts of Nagaland
2. To determine the factors affecting marketed surplus of cabbage applying simple multiple regressions

METHODOLOGY

Purposive stratified random sampling technique is applied in the present study in the selection of districts and villages selecting one village from each district. Longkhum village

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from Mokokchung district and Soku village from Wokha district are purposively selected based on their economic importance of cabbage cultivation and marketing. From each district, samples of 50 respondents were collected based on pre-test structured questionnaire totaling 100 samples. The study pretends to the crop year 2012-13.

Marketable surplus is estimated as

MS = P – C
Where, MS–Marketable surplus, P – Total production, C – Total requirement (Self consumption, gift and payment in kinds)

Marketed surplus is estimated as

Md.S = MS – Post-harvest loss (at farm)
Where, Md.S – Marketed surplus, MS – Marketable surplus

Multiple regressions co-efficient as

$MS = a_0 + b_1 X1 + b_2 X2 + b_3 X3 + b_4 X4 + \ldots + b_n Xn + U_t$
Where, MS = Marketed surplus, a_0 – Constant, b's – Regression coefficient of independent variables, U_t – Error term, X1 = Family size, X2 = Age of the respondents, X3 = Education of the respondents in years, X4 = Area under the crop (in hectare), X5 = Production of selected crops (kg/household), X6 = Self consumption of the farm (kg/household), X7 = Other use i.e. for gift and religious payments, X8 = post-harvest losses from producer till consumer (kg/household), X9 = Price of the commodity (Rs/kg), X10 = Storage facility (1 – for adequate and 0 – for otherwise), X11 = Weather condition (1 – for adequate and 0 – for otherwise), X12 = Transportation facilities (1 – for adequate and 0 – for otherwise), X13 = Market linkage (1 – for adequate and 0 – for otherwise), X14 = Marketing facilities (1 – for adequate and 0 – for otherwise), X15 = Availability of labour (1 – for adequate and 0 – for otherwise)

RESULTS AND DISCUSSION

Marketable and Marketed Surplus

Table 1 reveals average production of cabbage is 9.29 quintals of which the total retention for home consumption and other use is 3.43% in Longkhum village; this left a marketable surplus of 96.57%. On contrary, the average production of cabbage in Soku village is 4.73 quintals lower than their counterpart village while retention for home consumption and other use is (7.94%) thus leaving 92.06% as marketable surplus. In respect to home consumption and other use viz. gift to friends and relatives, payment to labour in kind and other religious payment is recorded higher in Soku village resulting in decline percentage of surplus. Thus, low percentage of marketable surplus in Soku village is because of their high retention purpose. With less marketing opportunities for the farmers to sell the surplus is also noticed to rise in home consumption and in kind as gift to friends and relatives in the study area.

The table further shows lack of post-harvest storage facility, lack of market link and marketing information, poor economic management and losses due to mishandling, wastage and spoilage by removing the outer layer of the cabbage resulted in post-harvest loss of 0.95 quintals (10.19%) in Longkhum village and thus the actual quantity marketed is 8.03 quintals (86.38%). Similarly, in Soku village, post-harvest loss due to lack of adequate economic infrastructure is 1.21 quintals (25.57%). This reveals, average post-harvest loss per farm is higher in Soku village than the Longkhum village and the marketed surplus is 66.49% comparatively lower than the Longkhum village.

Table 1 Production, marketable and marketed surplus of cabbage

Particulars	Longkhum	Soku
	Average (q)	Average (q)
Production	9.29 (100.00)	4.73 (100.00)
Total Retention [a+b]	0.32 (3.43)	0.38 (7.94)
[a] Self consumption	0.1 (1.08)	0.08 (1.78)
[b] Other use	0.22 (2.35)	0.29 (6.16)
Marketable surplus	8.97 (96.57)	4.36 (92.06)
Post-harvest loss	0.95 (10.19)	1.21 (25.57)
Marketed surplus	8.03 (86.38)	3.15 (66.49)

Source: Based on Field Survey, 2012-13
Note: Figure in parenthesis is in percentage to total

Regression Results

The regression results of cabbage in Longkhum village are presented in the Table 2. Here all the selected variables shows expected sign while factors like production, self consumption, post-harvest loss, storage and labour availability are showing statistical significant on dependent variable. Production and storage facility shows positive effect at 1% and 5% probability level of significance suggesting a unit increase in both these factors will augment marketed surplus by 896.88 kg and 43.50 kg respectively.

This is due to the fact that as production increase, farmer-producer is left with more surpluses for marketing. Likewise, with better storage provision, losses due to spoilage and rotting will decline adding to surplus.

While self consumption, post-harvest loss and labour availability indicates negative effect on marketed surplus at 5%, 1% and 1% level of significance respectively. This indicates a unit increase in self consumption at farm will reduce marketed surplus by 104.41 kg because as consumption increase fewer surplus will be available for marketing. Similarly, a unit increase in the post-harvest loss will reduce marketed surplus by 92.21 kg. In case of labour availability, the result shows negative significance at 1% probability level reducing marketed surplus by 152.96 kg. Since cultivated area under crop is marginal and the existing family member is just enough to cultivate the crop, an additional labour will have negative impact on production dropping surplus. Thus,

variables explain 99% of the variations in the marketed surplus. Education, weather and market facility are other dummy variables showing inverse relationship with marketed surplus though not significant at the estimated p-value 0.05.

Table 2 Regression results of Longkhum village [with all variables]

Variables	Coefficients	Std. Error	t-value
Constant	-4448.471	472.260	-9.420
Family size	14.261	10.410	1.370
Age	.848	1.795	.472
Education	-1.911	2.840	-.673
Area	-227.627	194.948	-1.168
Production	896.875	70.165	12.782*
Self consumption	-104.405	49.427	-2.112**
Other use	-.555	13.918	-.040
Post-harvest loss	-92.214	23.903	-3.858*
Price	2.750	8.203	.335
Storage (DV)	43.496	21.344	2.038**
Weather (DV)	-29.111	22.919	-1.270
Transportation (DV)	2.806	18.056	.155
Market link (DV)	31.984	29.707	1.077
Market facility(DV)	-15.421	25.051	-.616
Labour availability (DV)	-152.958	37.158	-4.116*
R^2		0.987	
F change		246.652	
N		50	

Source: Based on Field Survey, 2012-13
Note : DV-Dummy Variable
* ** ***-significance at 1%, 5% & 10% probability level respectively

The regression estimation after reducing dummy variables and refitting the model in Longkhum village resulted; area and production have positive statistical significance at 1% probability level depicting a unit increase in the two variable will increase marketed surplus by 510.80 kg and 786.97 kg respectively (Table 3). Post-harvest loss has negative relationship with marketed surplus and is statistically significant at 1% level of significance. This shows marketed surplus will decline by 100.22 kg for a unit increase in post-harvest loss.

Table 3 Regression results of Longkhum village [without DV]

Variables	Coefficients	Std. Error	t-value
Constant	-3926.593	493.704	-7.953
Family size	7.006	11.615	.603
Age	.559	2.078	.269
Education	-3.331	3.133	-1.063
Area	510.796	149.241	3.423*
Production	786.972	74.915	10.505*
Self consumption	-79.882	56.887	-1.404
Other use	3.358	15.687	.214
Post-harvest loss	-100.220	28.756	-3.485*
Price	-7.726	8.969	-.861
R^2		0.980	
F change		267.970	
N		50	

Source: Based on Field Survey, 2012-13
Note: * ** ***-significance at 1%, 5% & 10% probability level respectively

On contrary, regression results with all variables having expected signs in Soku village is shown in Table 4. Family size and production have positive and are statistically significant at 5% and 1% probability level of significance. For family size, a unit change in this factor will increase marketed surplus by 20.30 kg; the reason could be increase in family size will induce area expansion as more members to handle the crop, increasing production, increasing marketed surplus. The table

further reveals self consumption, weather and labour availability have inverse relationship with marketed surplus decreasing surplus by 123.65 kg, 24.24 kg and 36 kg respectively.

Table 4 Regression results of Soku village [with all variables]

Variables	Coefficients	Std. Error	t-value
Constant	-2334.269	297.714	-7.841
Family size	20.295	9.068	2.238**
Age	-1.160	1.257	-.923
Education	-.320	2.198	-.146
Area	-113.557	177.260	-.641
Production	515.444	48.316	10.668*
Self consumption	-123.647	45.000	-2.748*
Other use	-15.284	10.697	-1.429
Post-harvest losses	-1.713	22.913	-.075
Price	-3.843	8.085	-.475
Storage (DV)	1.573	15.920	.099
Weather (DV)	-24.244	13.852	-1.750***
Transportation (DV)	24.426	15.455	1.580
Market link (DV)	-30.708	21.722	-1.414
Market facility(DV)	31.937	20.054	1.593
Labour availability (DV)	-36.588	19.962	-1.833***
R^2		0.961	
F change		79.201	
N		50	

Source: Based on Field Survey, 2012-13
Note: DV-Dummy Variable
* ** ***-significance at 1%, 5% & 10% probability level respectively

Likewise after plummeting dummy variable, production and self consumption are two factors statistically significant at 1% and 10% probability level (Table 5). It reveals that a unit increase in production will improve dependent variable by 530.76 kg while a unit increase in self consumption will reduce the marketed surplus by 82.64 kg in Soku village. The variables explain 95 percent of the variation in marketed surplus after dropping qualitative factors.

Table 5 Regression results of Soku village [without DV]

Variables	Coefficients	Std. Error	t-value
Constant	-2573.135	265.754	-9.682
Family size	12.368	9.990	1.238
Age	-1.023	1.300	-.786
Education	1.152	2.114	.545
Area	-48.768	183.310	-.266
Production	530.759	44.485	11.931*
Self consumption	-82.637	47.474	-1.741***
Other use	-16.287	11.555	-1.409
Post-harvest loss	4.821	25.250	.191
Price	-3.683	8.700	-.423
R^2		0.948	
F change		100.078	
N		50	

Source: Based on Field Survey, 2012-13
Note: * ** ***-significance at 1%, 5% & 10% probability level respectively

CONCLUSION

The present study results that average production and marketable surplus of cabbage to be higher in Longkhum village then their counterpart village. Post-harvest loss due to wastage, spoilage, mishandling and lack of market linkage was more than 25% in Soku village having only 66.49% as marketed surplus.

Incase of Longkhum village, the quantity actual marketed is 86.38%, thus showing better performance of farmer-producer in the study area of Mokokchung district. It further concludes

that area and production are major factors having positive significance on marketed surplus while self-consumption and post-harvest loss are determinants with negative impact on the dependent variable.

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