

Economic analysis on production and marketing of Chilli in Mokokchung District of Nagaland#

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Abstract

The present study is based on information collected from 50 chilli growers, 12 retailers and 8 wholesalers from the Mokokchung district of Nagaland in the crop year 2012-13, through pre-tested well design questionnaire. Purposively the paper intent to discover the surplus, cost, margin and price spread of chilli production and marketing in Longsa village. The study resulted that after holding 9.5% for domestic purpose, producers are left with 90.5% as marketable surplus of which the actual marketed surplus is 86.33%; due to 4.17% loss in spoilage and wastage. Regression coefficient with and without dummy factor shows area and production are two major determinants having positive impact on marketed surplus at 1% probability level of significance. Further it has observed that a majority of the farmer-producer (52.3%) sell their produce to retailers i.e. channel – II indicating the most prominent channel. The net price received by producers in consumer's rupee in channel – I is 97.63%, channel – II: 82.43% and channel – III: 61.9% signifying producer-consumer channel the highest marketing efficiency channel according Shepherd's and Acharya-Agarwal methods. It further concluded that, 93% of chilli is traded in market by way of retailers and wholesalers and only 7% within village.

Key Words: Nagaland, production, marketed surplus, cost, margin, price spread, efficiency, constraints.

Introduction

Marketing implies a series of activities involved in moving the product from the point of production to the point of consumption involving time, place, form and ownership utility. Kohl[1] defined it as, "the performance of all business activities involved in the flow of goods and services from the point of initial agricultural production until they are in the hands of the ultimate consumers". While American Marketing Association defined, "marketing is the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large"[2]. Thus, in all case marketing is a critical business function for attracting customers. From a societal point of view, marketing satisfies the needs and wants between a society's material requirement and its economic patterns of response through exchange processes and building long term relationships. Marketing can be looked at as an organizational function and a set of processes for creating, delivering and communicating value to customers, and managing customer relationships in ways that also benefit the organization and its shareholders[3].

In recent times, production and marketing of agricultural crops received wide attention from the policy makers, planners and scholars due to its profitable enterprise and export potential (Srivastava, 1994)[4]. According to the Report of National Commission on Agriculture[5], "it is necessary to improve the marketing system to aid the process of agricultural development for two reasons: if the additional surplus is not move to the market to bring

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[1]Richard L. Kohl (1967). *Marketing of Agricultural Products,* p.1

[2]. Definition of Marketing, http://www.marketingpower.com/AboutAMA/Pages/DefinitionofMarketing.aspx

[3]Wikipedia (2013). *Marketing* from http://en.wikipedia.org/wiki/Marketing

[4] G .C. Srivastava (1994), in A. Prasad and J. Prasad (Eds.), *Development planning for Agriculture*, pp.317-330

[5] Report of National commission on Agriculture (1976), *part XII*, pp.110-186

additional revenue to farmers, it may work as disincentive to increase production; secondly, if the system does not supply foodgrains and other agricultural commodities, such as oils, fruits, vegetables, milk, fish, meat at reasonable prices to consumers at the time and place needed by them, increased production has no meaning in welfare society." It further state that, agricultural marketing is a process; starts with a decision to produce a saleable commodity which includes all market aspects both in pre and post harvest operation like assembling, storage and distribution.

Several institutions have been promoted by the Central and State Governments to develop the marketing of agricultural and horticultural crops with a view to improve market infrastructure, market facilities and reduce the margin of intermediaries so that marginal and small farmers receive higher share of consumer's rupee. The marketing of farm products is an intricate process and includes the entire marketing functions in moving the produce from the producers to the final consumers (Acharya and Agarwal, 2010)[6]. The shortest channel of marketing produce is from producer to consumer while other channel linking producer and consumer consist of intermediary viz. wholesaler and retailer in the study area.

Although considerable progress has been attained in agriculture technology by use of high-yielding variety seeds, chemical fertilisers and plant protection measures, the rate of growth in farming hasn't reach the expected level. This has largely been attributed to the fact that not enough attention has been given to marketing facilities and services in the North-East Region of India and particularly the state of Nagaland[7]. There is lack of institutional agencies involved in the distribution process; hence, farmer-producer sells directly to consumers and through retailers and wholesalers who of course take advantage of them. Thus, marketing condition in Nagaland is largely unorganized and subjugated by private traders. The study, therefore, attempts an in-depth investigation on production, surplus, and marketing conditions of chilli in Mokokchung district of Nagaland state and suggests possible options to promote an effective, efficient and integrated agricultural marketing system.

Review of studies

Some empirical studies conducted by few authors are cited incorporating the present study:

Thakur (1973)[8] examines the marketing margin and price spread of Indian apple concluding that marketing system was well integrated and that trader profit margins accounted 45.5% of the price paid by the consumers. The main implications of his study draw scope for traders to earn high profit.

Gupta and Ram (1979)[9] analyzed the behaviour of marketing margin and cost of vegetables in Delhi and concluded that producers received only 38% of the price paid by the consumer and the rest are earned by the middlemen as margin.

Agarwal & Saini (1995)[10] in their study on marketing of brassica from 50 respondents deduce low share of farmers was due to high marketing cost and high margin charge by agents.

Marothia, et al. (1996)[11] examines the marketing pattern of vegetables, marketing cost, margins and price-spread in different marketing channels and thereby suggest policy measures to improve vegetable marketing. Their results show that small farmers prefer to sell directly to consumer, while medium and large farmers sell their produce to retailers through commission agents.

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[6] S.S. Acharya & N.L Agarwal (2010). *Agricultural marketing in India*, 4th Ed., p.80

[7] Located between 25°6'N – 27°4'N latitude and between 93°20'E – 95°15'E longitude is bounded by Assam on the North and West, Manipur on the South, Arunachal Pradesh on the North East and shares international boundary with Myanmar on the East. Historically, the people are called '*Naka'* in Burmese meaning 'people with pierced ears'. Total population according to the census of India 2011 is 1,978,502 living 71.2% in rural villages with overall population density of 119 per sq.km. The total force is 49.2% of which 60% are absorb in agriculture. During 2012-13, about 40% of the GSDP was contributed by the primary sector while 45% by tertiary sector, resultant a poor agrarian economy.

[8] D. S. Thakur (1973), Pricing efficiency of the Indian apple market. *Indian Journal of Agricultural Economics*, 28 (4), pp.105-114

[9] A.K. Gupta & G.S. Ram (1979), Behavior of marketing margins and costs of vegetables in Delhi. *Indian Journal of Agricultural Economics*, 43 (4), pp.209-210

[10] N.L. Agarwal & T.C. Saini (1995), Vegetable marketing: Case Study of Jaipur Market (Rajasthan). *Indian Journal of Agricultural Marketing*, 9(1), pp.36-43

[11] D.K. Marothia et al. (1996), Vegetables marketing: A case study of two markets in Chattisgarh region of Madhya Pradesh. *Bihar Journal of Agricultural Marketing*

Chole et al. (2003)[12] set up marketable surplus was no different to marketed surplus because of its perishability, lack of storage and price fluctuation, and that surplus is negatively related with farm size. Supplementary, per quintal cost of marketing brinjal by producer was highest in channel II followed by channel I and III. Consequently, high marketing margin pocketed by intermediary in channel II and III resulted in poor marketing efficiency of brinjal.

Jyothi and Raju (2003)[13] purposively conducted a study on marketing pattern and price spread of Crossandra, Jasmine and Rose flowers in east Godavari district of Andhra Pradesh during 1995-96, and concluded that producers share in consumers rupee was 63.38% for crossandra; 58.06% for jasmine and 50% for rose.

Balappa and Hugas (2003)[14] attempts to examine the economics of onion production and its marketing cost, marketing channels, producers share in consumer's rupee, price spread in Karnataka State from 150 cultivators. Out of four channels, channel IV was not popular i.e. producer-consumer channel. The producers share in consumer's rupee was roughly equal in channel I and II, and further brought out that among the market intermediaries, share of retailers was greater than other market agents.

Chauhan and Chhabra (2005)[15] conducted a study on production and marketing of maize and established channel II dominant were 71.9% of the producer marketed 70%. Their regression coefficient depicts only production having positive effect on the size of marketed surplus while the family size and price have inverse relationship with marketed surplus.

Sadhu (2011)[16] found out that the average marketable surplus of potato was 83.1%. The average retention was 56.32 quintals (16.93%) of which home consumption were 2.38%; wage in kind, 7.37%; paid to artisans, 2.81%; seed requirement, 1.86% and spoilage, 2.51%. Across farm size, wage in kind was high among the large farmers due to higher wage paid by them to labours and village artisans.

Barakade et al. (2011)[17] in their studies on economics of onion cultivation resulted that maximum quantity of onion was transacted through channel IV (75.90%) followed by channel II (21.30%), channel III (12.98%) and channel I (2.88%). Producers share in consumer's rupee was highest in channel I (93.06%) and lowest in channel IV (68.82%). Thus, channel I was the most efficient marketing channel.

Joshi (2011)[18] in his study found out three channels for disposing brinjal and concluded producers share in consumer's rupee to be highest where there is less number of intermediaries.

Dastagiri et al. (2013)[19] conducted a study on Indian vegetables in 8 states covering 20 crops concluded that, producer-wholesaler-retailer-consumer is the most common marketing channel followed by producer-retailer-consumer and producer-consumer channel. The efficient channel was producer-consumer channel and set up marketing cost, margin, transportation and labour cost are factors adversely affecting marketing efficiency while open market price, volume of produce and net price received are increasing factors for marketing efficiency.

Kalidas and Akila (2014)[20] in their study concluded nearly all farmers sell their produce to the wholesalers and further suggest efforts should be made to espouse superior packing techniques and materials at farm level.

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[12] V.M. Chole et al. (2003), Price spread in marketing of brinjal in Maharashtra State. *Agricultural Marketing*, XLVI (2), pp.5-8

[13] S. Hyma Jyothi & V.T. Raju (2003), Study on marketing of Crossandra, Jasmine and Rose flowers in east Godavari District of Andhra Pradesh. *Agricultural Marketing*, XLVI (2), pp.2-4

[14] S.R. Balappa & L.B. Hugas (2003), An economic evaluation of onion production and its marketing system in Karnataka. *Agricultural Marketing*, XLVI (2), pp.22-26

[15] S.K. Chauhan & Amit Chhabra (2005), Marketable surplus and price-spread for maize in Hamirpur Districts of Himachal Pradesh. *Agricultural Economics Research Review*, 18, pp.39-49

[16] Bela R. Sadhu (2011), Marketable surplus of potato. *International Referred Research Journal*, 2 (25), pp.65-66

[17] A.J. Barakade et al. (2011), Economics of onion cultivation ant its marketing pattern in Satara District of Maharashtra. *International Journal of Agricultural Sciences*, 3(3), pp.110-117

[18] Gaurav Joshi (2011), An analysis of marketed surplus and price spread of brinjal in Western Uttar Pradesh. *Asian Journal of Management Research*, 2(1), pp.484-490

[19] M.B. Dastagiri et al. (2013), Indian vegetables: Production trends, marketing efficiency and export competitiveness. *American Journal of Agriculture and Forestry*, 1(1), pp.1-11

[20] K. Kalidas & K. Akila (2014), Micro level investigation of marketing and post harvest losses of tomato in Coimbatore District of Tamilnadu. *Journal of Stored Products and Post harvest Research*, 5(1), pp.1-7

Research Questions

- How do farmer-producers sale their surplus and what are its cost involved?
- What is the marketing cost and marketing margins of market intermediaries?
- What is the price spread under various channels?
- What is producers share in consumer's rupee?
- Which channel is efficient for marketing of chilli?
- What are the main constraints perceived by farmer-producer?

Objectives

The present study is intended to following objectives:

- To estimate production, retention, marketable and marketed surplus.
- To analyse the factors determining marketed surplus.
- To identify the existing channels in marketing of chilli and verify foremost channel.
- To study the marketing cost, marketing margin and price spread.
- To establish the producers share in consumer's rupee.
- To determine marketing efficiency i.e., the efficient channel in marketing of chilli.
- To examine the selling behaviour and constraints of farmer-producer.

Methodology

Longsa[21] village under Mokokchung District of Nagaland is purposively selected in the present study because of its high economics in production and marketing of chilli. Information on production, retention, marketable and marketed surplus, disposal pattern, price and cost were largely collected by means of well structured questionnaire from 50 respondents. Throughout the survey, 12 retailers and 8 wholesalers were interviewed who involved in chilli commerce. Field assessment is conducted during crop year 2012- 2013.

Marketing cost:

$$TC = P_c + \sum MC_{ith}$$

Where,

TC - Total marketing cost

P_C - Marketing cost of producers

MC_{ith} - Marketing cost of ith intermediaries

Marketing margin:

$$MM = Sp - (Pp + Mc)$$

Where,

MM - Marketing margin

Sp - Selling price

[21] The total geographical area of the village is 53.43 sq. km situated about 30 km away from the District Head Quarters (HQs). Its percentage share to total geographical area of the District is about 3.31 percent. The village is composed of 505 households with the total population of 2,603 of which male population constitute 50.50% and female 49.50%. The overall literacy of the village is 80.97% with male population having more literates than female. The total work force participation rate of the village is 58.27% of which the percentage of cultivators to total workers is 47.75%; other workers: 8.17%; household industries: 1.18% and agricultural labourers: 1.15%. This shows agriculture influence village.

Pp - Purchase price
Mc - Marketing cost

Producers share:

$$PS = \frac{P_r}{C_p} X\ 100$$

Where,
PS - Producers share
Pr - Price received by producer-farmer
Cp - Consumers price

Price spread:

$$PS = PC - PR$$

Where,
PS - Price spread
PC - Price paid by final consumer
PR - Price received by ultimate producer

Farmer-producer net price:

$$NP_P = GP_P - \{C_P + (ML_P \times GP_P)\}$$

Or

$$NP_P = \{GP_P\} - \{C_P\} - \{ML_P \times GP_P\}$$

Where,
NP_P - Net price received by the producers
GP_P - Gross price received by producers
C_P - Marketing cost incurred by the producers
ML_P - Marketing Losses

Marketing Efficiency is determined applying conventional, Shepherd's and Acharya-Agarwal methods

Conventional Method:

$$CM = \frac{\text{Value added}}{\text{Total marketing cost}}$$

Where,
CM - Conventional method
Value added - $(C_P - NP_P)$

Shepherds, 1965[22]:

$$ME = \frac{V}{I} - 1$$

Where,
ME - Marketing efficiency
V - Consumers price

[22] G.S. Shepherd (1965), *Marketing farm products: Economic analysis*

Acharya-Agarwal, 2001[23]:

$$ME = \frac{NP_P}{MC+MM}$$

Where,

ME - Marketing efficiency
I - Total marketing cost
NPp - Net price of producers
MC - Marketing cost
MM - Marketing margin

The factors affecting marketed surplus is expressed in the form of equation as:

MS = f (X1, X2, X3, X4, X5, X6,X7… ……. Xn)

Where,

MS - Marketed surplus and 'f' is the functional relationship, X1 - Family size, X2 - Age of the respondents, X3 - Education of the respondents in years, X4 - Area under the crop (in hectare), X5 - Production (kg/household), X6 - Self consumption of the farm (kg/household), X7 - Other use i.e. for gift and religious payments, X8 - Post-harvest loss from producer till consumer (kg/household), X9 - Price of chilli (Rs/kg), X10 - Storage facility (1-for adequate and 0-for otherwise), X11 - Weather condition (1-for adequate and 0-for otherwise), X12 - Transportation facility (1-for adequate and 0-for otherwise), X13 - Market linkage (1-for adequate and 0-for otherwise), X14 - Marketing facility (1-for adequate and 0-for otherwise), X15 - Availability of labour (1-for adequate and 0-for otherwise)

In view of analyzing the factors determining marketed surplus, a multiple linear regression model has been applied as specified below:

$$Y_t = \sum_{i=0}^{n} \beta_1 X_i + \mu_t$$

Also, $MS = a_0 + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + \ldots + b_n x_n + \mu_t$

Where,

a_0 - Constant
b's - Regression coefficient of independent variables
x's - Determinants of marketed surplus
μ_t - Error term

Results and Discussion

Marketable and Marketed Surplus

The quantity produce for sell by farmer-producer after holding for self consumption, gift to friends and relatives including all payment in kind is the marketable surplus, whereas the actual quantity brought in the market for sell irrespective of home consumption, gift and kind is the marketed surplus (Acharya and Agarwal, 2010)[24]. Farmer-producers surplus is the quantity which is actually made available to the non-producing population and all market arrangements have to be made for this surplus available with the farmers. However, mere increase in agricultural production is not important for agrarian economics but marketable surplus must also increase simultaneously (Chole et al., 2003)[25]. In recent times, there has been prominent studies estimating marketable and marketed surplus at both micro and macro level and have been used to bring out the nature and extent of sell by farmer-producer in the current study (Kohls, 1967; Narain, 1961; Shepherd, 1965; Nadkarni, 1980; Goel and Singh, 1998; Joshi, 2011; Chauhan and Chabra, 2005; Baba et al., 2010; Chole et al., 2003; Gunwant, et

[23] S.S. Acharya & N.L. Agarwal (2001), *Agricultural marketing in India*, pp.98-138
[24] Acharya & Agarwal (2010), *op cit.,* pp.47-48
[25] V.M. Chole et al. (2003), op.cit.

al.,2012; Mehta and Chauhan, 1996; Sashimatsung, 2015; Kaur et al.,2013; Dastagiri et al., 2013; Kalidas and Akila, 2014).

Out of 470.17 quintals of production, the surplus available for marketing is 425.51 quintals (90.5%) after holding 44.66 quintals (9.5%) for home consumption and other use as gift to friends, relatives, labour and religious payment (see Table 1). However, the actual quantity of chilli marketed by farmer-producer is 86.33% of the total output. This is due to absence of storage facilities near the production area, lack of timely transportation and market link, mishandling, wastage, spoilage and rotting of chilli being highly perishable absorbed 4.17% loss. Conventional attitude and ignorance of the farmer-producer detect add in retention especially 'other use' as gift cutting down marketable surplus. Therefore, an efficient marketing system via training and information will diminish use of gratuitous or extra farm retention enhances surplus adding value in the study area.

Table 1 further depicts production of chilli in June is 146.95 quintals; July: 197.08 quintals and August: 126.14 quintals severally presenting utmost output in July (peak season) and low in August (lean season). The retention for home consumption and other use recorded towering in July waning as production plummet in August. Thus, the percentage of marketable surplus entered high during the lean period followed by June and July. Also, better handling of crop is note among the farmer-producer in August (3.62%) than subsequent months. This is due to fewer quantity of chilli to manage, rise in market price and demand unlike months of June and July when market is glut. As a result, the percentage of quantity actually marketed is about 90% in August followed by June (85.56%) and July (84.79%).

Table 1: Production, marketable and marketed surplus of chilli

(In quintal)

Particulars	June	July	August	Overall
Production	146.95 (100.00)	197.08 (100.00)	126.14 (100.00)	470.17 (100.00)
Total Retention [a+b]	15.05 (10.24)	21.1 (10.71)	8.51 (6.75)	44.66 (9.5)
[a] Home consumption	3.73 (2.54)	5.30 (2.69)	3.16 (2.51)	12.19 (2.59)
[b] Other use	11.32 (7.70)	15.80 (8.02)	5.35 (4.24)	32.47 (6.91)
• Gift to friends	1.56 13.78*	2.1 13.29*	0.54 10.09*	4.2 12.93*
• Gift to relatives	1.05 9.28*	2.19 13.86*	0.47 8.78*	3.71 11.43*
• Gift to labours	0.61 5.39*	0.81 5.13*	0.16 2.99*	1.58 4.87*
• Religious payment	8.1 71.55*	10.7 67.72*	4.18 78.13*	22.98 70.77*
Marketable surplus	131.9 (89.76)	175.98 (89.29)	117.63 (93.25)	425.51 (90.5)
Post-harvest loss	6.17 (4.2)	8.87 (4.5)	4.57 (3.62)	19.61 (4.17)
Marketed surplus	125.73 (85.56)	167.11 (84.79)	113.06 (89.63)	405.9 (86.33)

Source : Based on Field Survey, 2012-13
Note : Figure in parenthesis is in percentage to respective month-wise and overall production
*- are in percentage to other use

Factors affecting marketed surplus

The regression result of chilli with dummy variables is demonstrated in Table 2. While area, production, storage and transportation are positively significant at 1% probability level signifying a unit increase in these variables will augment marketed surplus by 897.14 kg, 832.82 kg, 75.94 kg and 105.85 kg individually. This means with increase in area, more crops will be brought under cultivation accumulating output escalating surplus for marketing. Chilli being highly perishable, storage capacity will append to marketed surplus and with appropriate

transportation will eliminate the risk of post-harvest loss adding to surplus. Conversely, age of the farmer, self consumption and post-harvest loss have negative impact on marketed surplus at p-value 0.05. The negative coefficient of age indicates, with age increase, physical fitness of the farmer-producer slow lowering working hour waning output. Alike post-harvest loss due to mishandling, spoilage and wastage, and increase in self consumption trim down marketed surplus by 47.75 kg and 92.68 kg respectively. Thus, variables with dummy explain 99 percent of the variation in the marketed surplus.

Monthly wise inference of regression analysis indicates that in June age, area, production, storage, transportation and market facility are major determinants having statistical significance at the estimated p-value 0.05 (see Table 2). Except age of the farmer, the other five variables show positive relationship with marketed surplus. The 5% statistical significance of market facility means with the provision and availability of marketing facility like storage, information on price, arrival and rest room will motivate positively the farmer-producer to produce more thus, augment marketed surplus. In July area, production, price, storage, transportation and market facility have positive relationship with the dependent variable. Here, price is statistically significant at 10% probability level of significance indicating a unit increase in price will boost marketed surplus by 4.87 kg; this elucidates enhanced price have a direct influence on farmer-producer mind. While self consumption, other use and post-harvest loss show negative relationship with marketed surplus during the month. The negative significance of 'other use' to marketed surplus is with increase in the need for gift to friends, relatives, labours and religious payment will directly shrink surplus. Therefore, marketed surplus of the respondents is significantly affected when there is an increase in other use. Likewise in the month of August, the variables having positive statistical significance are area, production, price, storage, transportation and market facility while the variable 'other use' have negative significant impact on the marketed surplus.

Table 2: Regression results of chilli with dummy variables

Variables	**June** Coefficient (t-value)	**July** Coefficient (t-value)	**August** Coefficient (t-value)	**Overall** Coefficient (t-value)
Constant	-1245.83	-2042.58	-1628.20	-4375.63
Family size	3.20 (1.47)	2.98 (1.59)	2.62 (1.08)	9.36 (1.50)
Age	-0.95 (1.73)***	-0.77 (1.58)	-0.56 (1.05)	-2.77 (1.78)***
Education	0.29 (0.38)	0.14 (0.18)	0.66 (0.89)	1.78 (0.78)
Area	295.05 (4.40)*	219.98 (3.13)*	274.07 (3.83)*	897.14 (4.19)*
Production	225.56 (7.04)*	394.86 (10.14)*	225.89 (8.77)*	832.82 (7.69)*
Self consumption	-6.89 (0.88)	-15.93 (2.51)*	12.28 (1.62)	-47.75 (2.17)**
Other use	-2.64 (0.22)	-32.41 (2.70)*	-8.89 (1.70)***	-68.48 (1.54)
Post-harvest loss	-12.24 (0.89)	-32.14 (2.02)**	-4.16 (0.44)	-92.68 (1.77)***
Price	4.22 (1.43)	4.87 (1.71)***	11.26 (3.14)*	0.83 (0.13)
Storage (DV)	24.53 (2.50)*	23.91 (2.70)*	21.84 (2.11)**	75.94 (2.68)*
Weather (DV)	-0.09 (0.12)	-1.24 (0.25)	-8.44 (1.52)	-8.25 (0.53)
Transportation (DV)	40.97 (5.03)*	29.59 (4.31)*	27.16 (3.28)*	105.85 (4.62)*
Market link (DV)	-5.43 (0.62)	-13.03 (1.65)	-9.75 (1.19)	-35.12 (1.44)
Market facility (DV)	24.48 (2.18)**	17.12 (1.69)***	19.89 (1.96)***	48.17 (1.49)
Labour availability (DV)	-4.39 (0.55)	3.32 (0.49)	-1.78 (0.23)	2.71 (0.12)

R^2	0.983	0.988	0.983	0.985
F change	189.794	281.291	191.154	219.953
N	50	50	50	50

Source : Based on Field Survey, 2012-13
Note : DV-Dummy Variable
Figure in parenthesis indicates't' value of the estimates
* ** ***-significance at 1%, 5% & 10% probability level respectively

The regression coefficient of chilli plummeting all dummy variables depict area and production predominant at 1% probability level of significance suggesting that a unit increase in these factors will augment surplus by 849.68 kg and 890.80 kg correspondingly (see Table 3, overall column). Whilst 'other use' have negative relationship statistically significant at 10% level dropping surplus by 126.32 kg for a unit increase in gift and kind. Similarly, in June and July, area and production are major factors for increase surplus whilst an increase in 'other use' shrivel surplus. In August variables having statistical significance at estimated value 0.05 are all positively related with marketed surplus. The R^2 explains 96% variation without dummy variables.

Table 3: Regression results of chilli without dummy variables

Variables	**June** Coefficient (t-value)	**July** Coefficient (t-value)	**August** Coefficient (t-value)	**Overall** Coefficient (t-value)
Constant	-1522.23	-1817.39	-2306.61	-4903.18
Family size	-2.24 (0.71)	-0.28 (0.10)	-2.79 (0.89)	-4.57 (0.49)
Age	-0.23 (0.28)	0.31 (0.43)	0.28 (0.38)	-0.16 (0.07)
Education	0.72 (0.60)	0.84 (0.71)	0.76 (0.70)	2.84 (0.78)
Area	292.47 (2.98)*	286.86 (2.69)*	180.40 (1.93)***	849.68 (2.59)*
Production	272.43 (5.75)*	334.39 (5.73)*	258.94 (8.13)*	890.80 (5.50)*
Self consumption	3.01 (0.26)	-14.02 (1.39)	-3.89 (0.37)	-25.55 (0.73)
Other use	-29.45 (1.72)***	-34.41 (1.85)***	-7.75 (1.03)	-126.32 (1.87)***
Post-harvest losses	-27.61 (1.29)	-7.55 (0.31)	2.75 (0.21)	-87.25 (1.12)
Price	7.41 (1.60)	5.47 (1.20)	21.02 (4.55)*	7.72 (0.74)
R^2	0.956	0.969	0.962	0.959
F change	118.409	171.967	140.280	129.968
N	50	50	50	50

Source : Based on Field Survey, 2012-13
Note : Figure in parenthesis indicates't' value of the estimates
* ** ***-significance at 1%, 5% & 10% probability level respectively

Marketing channel

Marketing channels are combination of agency and intermediary through which the producer dispose his products in the market to the ultimate consumer. Increase in area and production augment marketable surplus: now, if there is no sufficient demand or appropriate marketing facility to absorb this increase production, or the failure of markets to transmit price would result in frequent market glut and associate price crash. The main factor that determine in decision making of the producer is the price offered by trader at harvest time (Sreenivasa et al. 2002)[26]. Far and distant marketing channels indicate how market intermediary are set to

[26] M.D. Sreenivasa et al. (2002), Post-harvest loss estimation in mango at different stages of marketing – A methodological perspective. *Agricultural Economic Research Review*, 15(2), pp.188-200

accomplish the movement of a product from producer to the final consumer. The most commonly used channels by the farmer-producer detected in the present study are:

Channel I : Producer – Consumer
Channel II : Producer – Retailer/Vendor – Consumer
Channel III : Producer – Wholesaler – Retailer – Consumer

Disposal Pattern

The total quantity of chilli marketed by farmer-producer in channel I, II and III are 28.17, 212.09 and 165.64 quintals respectively presented in the Table 4. This show that 52.25% of the total marketed surplus is disposed through channel II followed by channel III (40.81%) and Channel I (6.94%). Therefore, marketing of chilli is resulted to be more significant in channel II and less significant in channel I in the study area during the reference year.

Table 4: Disposal pattern of chilli

(In quintal)

Marketing Channel	Channel No	Quantity sold	In %
Producer – Consumer	I	28.17	6.94
Producer – Retailer/Vendor – Consumer	II	212.09	52.25
Producer – Wholesaler – Retailer – Consumer	III	165.64	40.81
Total		405.9	100.00

Source: Based on Field Survey, 2012-13

Marketing cost, marketing margin and price spread

Marketing costs vary from commodity to commodity and changes overtime depending on the nature of commodity, consumption, storage, transportation, market distance, packing, labour, tax and price (Achrya and Agarwal, 2010)[27]. Marketing cost and marketing margin differ considerably from channel to channel and are related directly to the length of the channel, i.e., longer the channel, marketing cost and marketing margin will be more. Marketing margin is the profit earned by different intermediaries involved in moving the product from the point of production till it reaches the ultimate consumer while difference between the price paid by the consumer and the price received by the producers for an equivalent quantity of farm produce is the price spread. In the view point of marketing efficiency, this gap has to be reduced to the closest minimum (Gunwant et al., 2012)[28].

Channel wise analysis of marketing cost, marketing margin, price spread and net price received by farmer-producer of chilli[29] is presented from Table 5 – 7. In channel I, farmer-producer gather their produce in the daily local market or goes through street as vendor and sell the fresh chilli directly to consumers maintaining entire cost of marketing. The total marketing cost (Table 5) incurred by farmer-producer is Rs.30.77/q which is 2.37% share in consumer's rupee accounted by high labour expense and purchase of plastic bags. The farmer-producer received Rs.1268.15/q as net price. Thus, producers share in consumer's rupee of chilli is 97.63% in channel I.

Table 5: Marketing cost, margin and price spread of chilli in Channel – I

[Rs/quintal]

Particulars	Chilli	Producers share in consumer's rupee (%)
Producer's Level		
Sale price	1,298.92	100.00

[27] S.S. Acharya & N.L. Agrawal (2010), op.cit., p.402

[28] Vinay Kumar Gunwant et al. (2012), A Comparative study of production and marketing practices of vegetables in Nainital and U.S. Nagar District of State of Uttarakhand, India. *International Journal of Advances in Computing and Information Technology*, pp.569-578

[29] Producers sell @ Rs. 46.11/kg in channel I; @ Rs. 53.24/kg in channel II and @ Rs. 39.54/kg in channel III. In channel III, wholesalers dispose to retailers at Rs.51.17/kg. The consumers price in channel II & III is settled at Rs. 62.67/kg.

Marketing cost		
• Labour cost	28.17	2.17
• Plastic bags	2.6	0.2
Total marketing cost of producer	30.77	2.37
Net price received by producer	1,268.15	97.63
Consumer's price	1,298.92	100.00

Source: Based on Field Survey, 2012-13

While in channel II, retailers subsist as an intermediary between producer and consumer (see Table 6). In this channel, farmer-producer sells their surplus produce to retailer and gain cost on transportation, packing and labour. The total marketing cost in this is Rs.623.52/q of which farmer-producer obtains 53.7% of the total cost while the percentage costs obtain by retailers is 46.3% (see Annexure I). It indicates cost of producers share in consumer's rupee is high among the farmer-producer than retailers attributed to their high transportation cost. At retailer's level cost of items include labour cost, plastic bags, market fee/tax, marketing loss and other miscellaneous cost of which losses due to spoilage and wastage accounted 1.5% of the producers share in consumer's rupee. The farmer-producer receives 82.43% of the consumer's rupee and the remaining 12.87% is obtained by the retailers as business margin after deducting 4.69% in cost. The difference in price paid by the consumer and the price received by the farmer-producer is Rs.2000.01/q showing more spread of price with additional mediator.

Table 6: Marketing cost, margin and price spread of chilli in Channel – II
[Rs/quintal]

Particulars	Chilli	Producers share in consumer's rupee (%)
Producer's Level		
Sale price	11,291.67	84.95
Marketing cost of producer		
• Total Transport cost	242	1.82
• Packing cost	32.8	0.25
• Labour cost	60	0.45
[A] Total marketing cost of producer	334.8	2.52
Net price received by producer	10,956.87	82.43
Retailer's Level		
Purchase price/sale price of producer	11,291.67	84.95
Marketing cost of Retailer		
• Labour charge	30	0.23
• Plastic bags	25.45	0.19
• Market fee/Tax	21.25	0.16
• Miscellaneous cost	12.73	0.1
• Marketing Loss	199.29	1.5
[B] Total marketing cost of Retailer	288.72	2.17
Net margin of Retailer	1,711.29	12.87
Total marketing cost [A+B]	623.52	4.69
Consumer's price	13,291.68	100.00

Price spread	2,000.01	15.05
Source: Based on Field Survey, 2012-13		

Out of Rs.926.86/q total marketing cost in channel III, wholesaler incurs 62.09% of the total cost followed by retailer and farmer-producer (see Annexure I). High marketing cost at wholesaler's level is on transportation (2.19%) because all necessary market agreement in reaching the commodity to different stakeholders from the place of production to market are arrange by them. Whilst low cost of farmer-producer is accounted to only assembling the commodity (by manual labour or by motor) to a point within the village or near production area accessible for wholesalers. The net price received by producers is Rs.6425.88/q (61.9%) and the net margin of wholesalers and retailers are Rs.1350.86/q (13.01%) and Rs.1677.06/q (16.16%) ensuing greater share in consumer's rupee are pocketed by market intermediaries in channel III (see Table 7). The analysis further reveals, marketing cost across marketing channel increases while producers share in consumer's rupee decline with market intermediaries augment (see Annexure II). Hence, as number of traders increase marketing cost increases, producers share in consumer's rupee decline, profit margins of the market intermediary increases and the price gap between producer and consumer amplify.

Table 7: Marketing cost, margin and price spread of chilli in Channel – III

[Rs/quintal]

Particulars	Chilli	Producers share in consumer's rupee (%)
Producer's Level		
Sale price	6,549.41	63.09
Marketing cost of producer		
• Assembling and handling charge	123.53	1.19
[A] Total marketing cost of producer	123.53	1.19
Net price received by producer	6,425.88	61.9
Wholesaler's Level		
Purchase price/sale price of producer	6,549.41	63.09
Marketing cost of Wholesaler		
• Transport cost	227.5	2.19
• Packing cost	19.5	0.19
• Labour cost	1.95	1.88
• Miscellaneous cost	6.63	0.06
• Marketing Loss	126.9	1.22
[B] Total marketing cost of Wholesaler	575.53	5.54
Net margin of Wholesaler	1,350.86	13.01
Retailer's Level		
Purchase price/sale price of Wholesaler	8,475.8	81.65
Marketing cost of Retailer		
• Plastic bags	19.88	0.19
• Market fee/Tax	21.25	0.2
• Miscellaneous cost	9.94	0.1
• Marketing Loss	176.73	1.7
[C] Total marketing cost of Retailer	22.78	2.19
Net margin of Retailer	1,677.06	16.16

Total Marketing cost [A+B+C]	926.86	8.93
Consumer's price	10,380.66	100.00
Price spread	3,831.25	36.91

Source: Based on Field Survey, 2012-13

Marketing efficiency

Marketing efficiency is essentially the degree of market performance. It is the ratio of market output to marketing input; higher is the ratio, greater the efficiency. Any increase in this ratio results good marketing efficiency while decrease shows poor marketing efficiency. A reduction in the cost for the same level of output or an increase in the output at a given cost results in the efficiency of marketing (Khols and Uhl, 1980)[30]. The improvement in marketing efficiency means the reduction of marketing cost without reducing the quantum of services to the consumer (Thamizhselvan and Murugan, 2012)[31]. Thus a higher level of consumer's satisfaction even at higher cost of marketing indicates marketing efficiency. Efficient marketing system ensure increase in farm production, increase real income and consumer's satisfaction with low possible cost. Therefore, an efficient marketing system is a pre-requisite for all-round development as it enables farmer-producer to secure better price in return gives incentives to produce more. Conventional, Shepherd's and Acharya-Agarwal methods are adopted in the present study to evaluate the marketing efficiency of chilli.

Marketing efficiency index ratio according to Shepherd's method in channel I is: 41.21, channel II: 21.32 and channel III: 10.20; according to Acharya-Agarwal channel I: 41.21, channel II: 4.69 and channel III: 1.62 (see Table 8). While Conventional[32] method results channel I: 1.0, channel II: 3.74 and channel III: 4.27. The results from Shepherd's and Acharya-Agarwal methods equally signify channel I the most efficient channel for marketing of chilli followed by channel II and III. Efficient marketing of channel I indicates absence of any mediator whilst low efficiency in channel II and III were the profit margins pocketed by the retailers and wholesalers.

Table 8: Marketing efficiency index of chilli in different marketing channels

[Rs/quintal]

Particulars	**Marketing channels**		
	Channel – I	**Channel – II**	**Channel – II**
Net price received by producer	1,268.15	10,956.87	6425.88
Marketing cost	30.77	623.52	926.86
Marketing margin	0.00	1,711.29	3,027.92
Value added by the marketing system	30.77	2,334.81	3,954.78
Consumer price	1,298.92	13,291.68	10,380.66
Marketing Efficiency			
• Conventional method	1.00	3.74	4.27
• Shepherd's method	41.21	21.32	10.20
• Acharya- Agarwal method	41.21	4.69	1.62

Source: Compiled by researcher, 2012-13

Selling behaviour of farmer-producer

It is a practice for most of the crops has to change hands three to four times from the producer before it reaches the final consumer. There are no village merchants, commission agents and itinerant dealers in the present study; therefore, producers are found to sell directly to consumers within village as vendors or in market by means of

[30] R.L. Kohls & J.N. Uhl (1980), *Marketing of Agricultural products* (5th Edition), p.589

[31] K. Thamizhselvan & P. Murugan (2012), Marketing of grapes in Theni District. *International Journal of Marketing and Technology*, 2(9), 96-111

[32] This method ensues channel III the most efficient channel; that is, more the intermediaries involve in marketing process, higher is the marketing efficiency. However, inference from conventional method is not applicable in India especially in Mokokchung district of Nagaland where more than 60% of the working population is engaged in growing food for their sustenance.

retailers and wholesalers. Consequently, the existing market is unorganized with no standardization of weights and measures, and no grading of commodity. Selling behaviour of farmer-producer in the present study is categorized in to 'place of sell' and to 'marketing channel'.

The behaviour of farmer-producer to place of sell is further split into 'within village' and 'in market' is illustrated in Table 9. It indicates that 93% of chilli is traded by the farmer-producer in market by means of retailers and wholesalers and only 7% is sold within village. Month-wise magnitude sell shows, in June sell within village is about 8.26% which decline to 4.91% in July is, the outcome of large output in July (peak period) and being highly perishable, farmer-producer prefer sell through agents in bulk even if at low price during this month (also refer Table 10 for average price). As a result, during July sell in market witness more than 95% of the surplus. Yet slight rise sell within village and drop in market in August is because of low surplus referring to lean harvest, increase in consumption demand and rise in consumer's price.

Table 9: Magnitude of sell within village and in market

(In quintal)

Place of sale	Month			
	June	July	August	Overall
Within village	10.39	8.20	9.58	28.17
	(8.26)	(4.91)	(8.47)	(6.94)
In market	115.34	158.91	103.48	377.73
	(91.74)	(95.09)	(91.53)	(93.06)
Total	125.73	167.11	113.06	405.9
	(100.00)	(100.00)	(100.00)	(100.00)

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

Secondly, selling behaviour of farmer-producer through different marketing channels or to agencies based on market price is discussed in Table 10, where 52% of the farmer-producer sell through retailers (channel-II) at average price of Rs.53.24/kg, 41% through wholesalers (channel-III) at Rs.39.54/kg and only 7% of the respondent sell directly to consumers (channel-I) at Rs.46.11/kg. Thus, the study concludes more than 52% of the respondent adopt retailer channel for marketing of chilli in Mokokchung district followed by wholesaler and direct to consumer channels. While in July, it is noted that most respondents (49.2%) marketed the surplus through wholesalers owing to peak time with no cold storage to harvest the surplus; perishability and to avoid the risk of wastage sell at flat price to wholesaler who buy in large quantity.

Table 10: Disposal of surplus chilli by respondents through different channels

(In percent)

Category	June	July	August	Total
Consumer	8.26	4.91	8.47	6.94
	43.72*	43.75*	49.59*	46.11*
Retailer	49.79	45.90	64.37	52.25
	51.08*	50.8*	57.83*	53.24*
Wholesaler	41.95	49.19	27.15	40.81
	37.24*	36.88*	45.82*	39.54*

Source : Based on Field Survey, 2012-13
Note : * - average selling price per kg

Constraints

Despite blessed with an ample range of agro-climatic conditions for growing chilli and other agricultural crops, there are still numerous constraints confront by farmer-producer adversely affecting development of a sound production, financing and marketing in Mokokchung district.

The study concluded 94% of the sample respondent requires storage facility in the vicinity of production, the foremost constraint. Correspondingly, lack of extension services (86%), risk of surfeit rain (82%) destroying crop pre-mature reducing output, lack of technical know-how (72%), lack of resources (68%) and shortage of physical labour (52%) are major constraints faced by the farmer-producer on production side. Physical labour become more acute at harvesting stage as it get synch with paddy weeding and other agricultural activities

waning accessibility of them. Consequently, wage per labour rise during this season as responded by 42%. Further on financial side, only 16% of the respondents react to availability of credit of which 6% reveal problem to unsatisfactory and bank conduct as procedural and time consuming. This reveals that, 84% of the respondents are still ignorant or not availing agricultural credits thus, 42% (as responded) borrow from friends and relatives at exorbitant interest to maintain the orchard.

In an agrarian economy, the immediate sell of a commodity after post-harvest producers receive lower price and this phenomenon of very concentration of market arrivals at a short period of time has been termed as 'Market getting choked' by Tyagi,[33]. High perishabilty of chilli with no cold storage facility forced farmer-producer to dispose the surplus immediately after the harvest when they are fresh is expressed by all the respondents on marketing side. Taking benefit of market situation, exploitative middlemen negotiates at cheap rate agree to by farmer-producer having weak bargaining power[34] is expressed by 98% of respondents. Subsequently, want of market link and lack of regulated and co-operative marketing societies, high transportation cost, and absence of market information were positively responded by more than 76%. Band, blockage, strikes, malpractice were other common constraints in marketing of chilli.

Conclusion

Thus, it is inferred that 90.5% of output is left as surplus after retaining 9.5% for consumption and other use, and the actual quantity market is 86.33% due to spoilage and wastage. To minimize post-harvest loss, proper storage facilities, education, market information and co-operative societies needs to be established. Across month, July is the peak time for harvest while percentage of marketed surplus noticed highest in August followed by June and July. Further regression results with dummy variables show area, production, storage and transportation are main determinants augmenting marketed surplus, whilst age of the farmer, self consumption and post-harvest loss are factors negating dependent variable at estimated p-value. Similarly, without dummy factors only area and production are dominant factors having positive relationship with surplus at 1% probability level of significance. Regarding marketing of chilli, it is concluded that channel – II is the dominant trail by channel – III and I, however, applying Shepherd's and Acharya-Agarwal methods channel – I is the most efficient channel. This means producers received 98% share of consumer's rupee in channel – I, and this drop with additional intermediary. In relation to selling behaviour, it has found out that 93% of chilli is traded by the farmer-producer in market by means of retailers and wholesalers and only 7% is sold within village. Lack of cold storage, extension service, agricultural-credit and subsidy, exploitative middlemen, unregulated market and absence of market information were major obstacles expressed by farmer-producer in production and marketing of chilli in the district. Therefore, market needs regulation including expenditure on transportation and packing, and build up necessary infrastructure for chilli marketing in the district. Labour saving practice should be developed and co-operative marketing should be encouraged to augment producers share in consumers' rupee. To safe guard the interest of all stakeholders, pro-active participation of Government is vital.

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[33] D.S. Tyagi (1990), *Managing India's food economy*, pp.113-116

[34] The first is, they do not have information on market arrival and prevailing market price; and second is, being perishable fear of spoilage and wastage (lack of storage to harvest surplus) hovering their mind have to sell at offered price of intermediary.

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Annexure I: Overview marketing cost of chilli met by various stakeholders

[Rs/quintal]

Intermediaries	Channel-I	Channel-II	Channel-III
Producer	30.77 (100.00)	334.8 (53.7)	123.53 (13.33)
Retailer	-	288.72 (46.3)	22.78 (24.58)
Wholesaler	-	-	575.53 (62.09)
Total cost	30.77 (100.00)	623.52 (100.00)	926.86 (100.00)

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

Annexure II: Overview per-quintal price spread and returns of Chilli

[Rs/quintal]

Intermediaries	Channel-I	Channel-II	Channel-III
Net price received by Producer	1,268.15 (97.63)	10,956.87 (82.43)	6,425.88 (61.9)
Net margin of Retailer	-	1,711.29 (12.87)	1,677.06 (16.16)
Net margin of Wholesaler	-	-	1,350.86 (13.01)
Cost of marketing	30.77 (2.37)	623.52 (4.69)	926.86 (8.93)
Consumer price	1,298.92 (100.00)	13,291.68 (100.00)	10,380.66 (100.00)

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

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