



Research Article

Maize seed marketing chains and marketing efficiency along supply chains of the hills in Nepal

K.C. Dilli Bahadur^{1*}, N. Gadal², S. P. Neupane³, R.R. Puri⁴, B. Khatiwada⁵, G. Ortiz-Ferrara⁶, A.R. Sadananda⁷, C. Böber⁸

^{1, 2, 3, 4, 5, 6, 7, 8}International Maize and Wheat Improvement Center (CIMMYT Intl., Mexico), CGIAR Center, Nepal.

Remoteness, poor infrastructures, labor shortages, small quantities of seed at the producer level and few private seed traders are inherent problems in maize seed production and marketing in the hills of Nepal. Farm-saved seed, including seed exchange and private sector supply are the main sources of improved maize seeds in Nepal. Using the primary data collected from 200 respondents across 20 hilly districts of Nepal, this paper analyzes marketing chains and the efficiency of marketing of improved maize seed along the supply chains.

The results show five major maize seed marketing chains. Chain I involved producers, collectors, wholesalers, retailers and consumers; Chain II involved producers, collectors, wholesalers and consumers; Chain III involved producers, collectors, retailers and consumers; Chain IV involved producers, collectors and consumers; and Chain V involved producers and consumers. A total of 64.3 tons of improved maize seed was marketed through the identified chains. Chain II was the most important supply chain, accounting for 38.8per cent of total marketed seeds; while Chain I was the least important, accounting for 4.3per cent. Producers' share on consumer price was highest in Chain V (100per cent) and lowest in Chain III (66per cent). Transportation cost accounted for the highest amount (average 47.5per cent). Highest margin of profit (NRs 6.5/kg) was taken by retailers and lowest by collectors (NRs 2.5/kg). Highest marketing efficiency with a magnitude of 7.24 was observed in Chain V and lowest with a magnitude of 0.9 in Chain I.

Keywords: Community-based seed production, agrovets, marketing chain, marketing efficiency, seed traders.

INTRODUCTION

Maize (*Zea mays L.*) is the second most important cereal crop in Nepal in terms of area and production. It is grown on about 0.85 million hectares and production is 1.99 million tons (MoAD, 2013). About 78per cent of the total maize cultivated area is in the hills. Maize is a major cereal crop in the mid-hills of Nepal, particularly among poorer families and disadvantaged groups. In the hills, maize is the main source of livelihoods – food, feed, fodder and fuel. And there is a common saying "if there is no maize... there is nothing to eat". Maize yield in Nepal is 2.35 tons per hectare (t/ha) (MoAD, 2013) against the attainable yield of 5.7 t/ha (Gurung, 2012). Global maize

productivity is 5.52 t/ha and in neighboring countries, India's average is 2.45 t/ha and the average in Bangladesh is 7.0 t/ha (FAO, 2013). The productivity of maize in Nepal is constrained primarily by poor access to improved varieties of seed, fertilizer, shortage of labour and farmers' lack of awareness about new maize production technologies, etc.

Corresponding Author: KC Dilli, International Maize and Wheat Improvement Center (CIMMYT Intl., Mexico), CGIAR Center. Email: d.kc@cgiar.org

Despite the past 50 years of seed development initiatives, unavailability of good quality seeds in sufficient amount at right time and place is the main constraint for improving lives of many Nepali farmers. The formal seed sector in Nepal has been incapable of narrowing the gap between seed requirements and the production of improved maize seed. Informal seed supply system provide more than 90per cent planting materials in the country (PACT, 2012). Farm-saved seed, including seed exchange, and private sector supply are the main sources of improved maize seeds in Nepal (KC, 2013). The majority of the improved maize seed producers in Nepal are located in very remote areas and small enterprises. Inherent problems in seed production and marketing at the farmer level are the small marketable surplus of seed at the individual level, poor accessibility due to remoteness and high transportation costs; these make the sector less attractive to private seed traders. The limited presence of private seed traders (agrovets and seed companies) results in very weak seed markets, particularly in the hills.

The overall goal of this paper is to assess seed marketing chains and analyze the marketing efficiency of improved maize seed produced under a community-based seed production (CBSP) system in the hills of Nepal. Meeting the overall goal, price spread, marketing costs and margin along the seed supply chains were examined.

In Nepal, seed multiplication of improved maize varieties through the Community-Based Seed Production (CBSP) program was initiated in the Hill Maize Research Project (HMRP) in 2000. This has been a very successful model, which significantly contributed to increase the production of improved seeds and has increased the seed replacement rate. In 2000, seven CBSP groups produced 14 tons of improved maize seed and in 2013 a total of 1,216 tons of improved seed was produced through 223 CBSP groups (HMRP, 2013). During this period the annual compound growth rate of maize seed under the CBSP program was 34.5per cent (KC, 2013). The maize seed replacement rate in Nepal increased from 5.81per cent in 2007 to 11.3per cent in 2011 (Pokharel and SQCC, 2012).

CBSP follows the approach of forming a community-based farmer group comprising 15 to 25 members and registered in the District Agriculture Development Office (DADO). The CBSP group produces improved maize seed of most preferred varieties best suited to the locality. This approach also aimed to strengthen the capacity of the local community as seed producers to primarily undertake seed production and marketing activities through the maturation of these groups into cooperatives and then to establish private seed companies for seed trading. The ultimate target of this approach is to increase the role of the private sector in

maize seed production and marketing in a sustainable way.

MATERIALS AND METHODS

In general, the study methodology involve assessing the structure of the maize seed marketing chains specifically exploring: what are the marketing chains?; who are the chain actors?; what are their functions?; and so on. More importantly it involved identifying the market chain within it—all who contributed to seed assembling, processing, grading, packaging, labeling and marketing of maize seed.

Data source

The study used primary data collected during the period September 2012 to March 2013 from 200 respondents including 178 CBSP farmers and 22 seed traders (cooperatives, seed banks/seed companies, agrovets). A purposive random sampling technique was used to select the sampling units. Twenty HMRP districts, where improved maize seed is produced in the communities, were selected purposively for the study. Data were collected through sample survey method. Focus group discussions (FGDs) and a key informant survey (KIS) were also conducted with related stakeholders to collect quantitative and qualitative information on several aspects of seed marketing.

Analytical methods

Marketing chain

A marketing chain is the chain of intermediaries through whom the product passes from producers to the ultimate consumers. Kohls and Uhl have defined marketing chains as alternative routes of product flows from producers to consumers.

The assessment of maize seed marketing chains was accomplished by analyzing the seed flow through various chains. Seed marketing analysis covered the services involved in assembling seed from the production point to the ultimate seed user (i.e. the consumer). The quantity of seed disposed through identified chains was comprehensively analyzed. In the marketing chain numerous interconnected activities like assembling, transport, processing, grading, packaging, labeling, storage and sale were assessed along the market chains.

Price spread

Price spread refers to the difference between the price paid by the consumer and price received by the producer. Price spread consists of marketing costs and margins of

the intermediaries (Prasad, 1989). Added costs and margins of the market intermediaries were calculated as the per cent of the buyer's price along the chain. The producer's share in consumer's price was estimated as per Prasad (1989) and Joel et al. (2013).

Marketing cost and margin

The major costs involved in the maize seed marketing chain were seed handling cost or load/unload, transportation, processing, grading, packaging, labeling, storage, etc. Marketing cost at various market actors was analyzed by taking the average cost of each activity incurred by market actors and expressed in NRs/kg. Marketing margins can also be categorized into gross and net margin. The gross marketing margin at the trader level can be explained as the difference between the sale price and the purchase price of that trader or the sum of incurred marketing costs and margin of profit taken by that trader. The gross marketing margin consists of the costs in moving the produce from the point of production to the consumers, whereas net marketing margin is simply the margin of profit of the trader taken against operating the business and expressed in NRs/kg.

Marketing efficiency

Marketing efficiency is the ratio of market output (satisfaction) to marketing input (cost of resources). An increase in the ratio represents improved efficiency and vice versa. In other words, it is the price received by the producer and expressed as a percentage of the consumer price. The efficiency of a marketing system is measured in terms of costs to the system of inputs to achieve a given amount of output. The Shepherd's Index formula (1965) was employed to estimate the marketing efficiency. The higher the ratio implies a higher marketing efficiency, or the chain is said to be more efficient and vice versa.

RESULTS AND DISCUSSIONS

Marketing Functions

Seed collection. Seed produced by the CBSP groups was assembled by seed collectors. A total of 64.3 tons of seed was entered into the marketing chain. Of this 53.4 tons (83per cent) of seed was collected by collectors (mainly cooperatives) and the remaining quantity was either directly sold or exchanged with maize-cultivating farmers (consumers) through the seed producers. Manakamana 3, Deuti, Rampur Composite, Manakamana 4, Arun 2, Manakamana 5 and Poshilo Makai 1 (QPM) were the common varieties of seed trading in the identified market chains. Seed from producers up to the collection point was transported primarily by porters, whereas transport from collector up-to retailer was done by pick-ups, small trucks and buses.

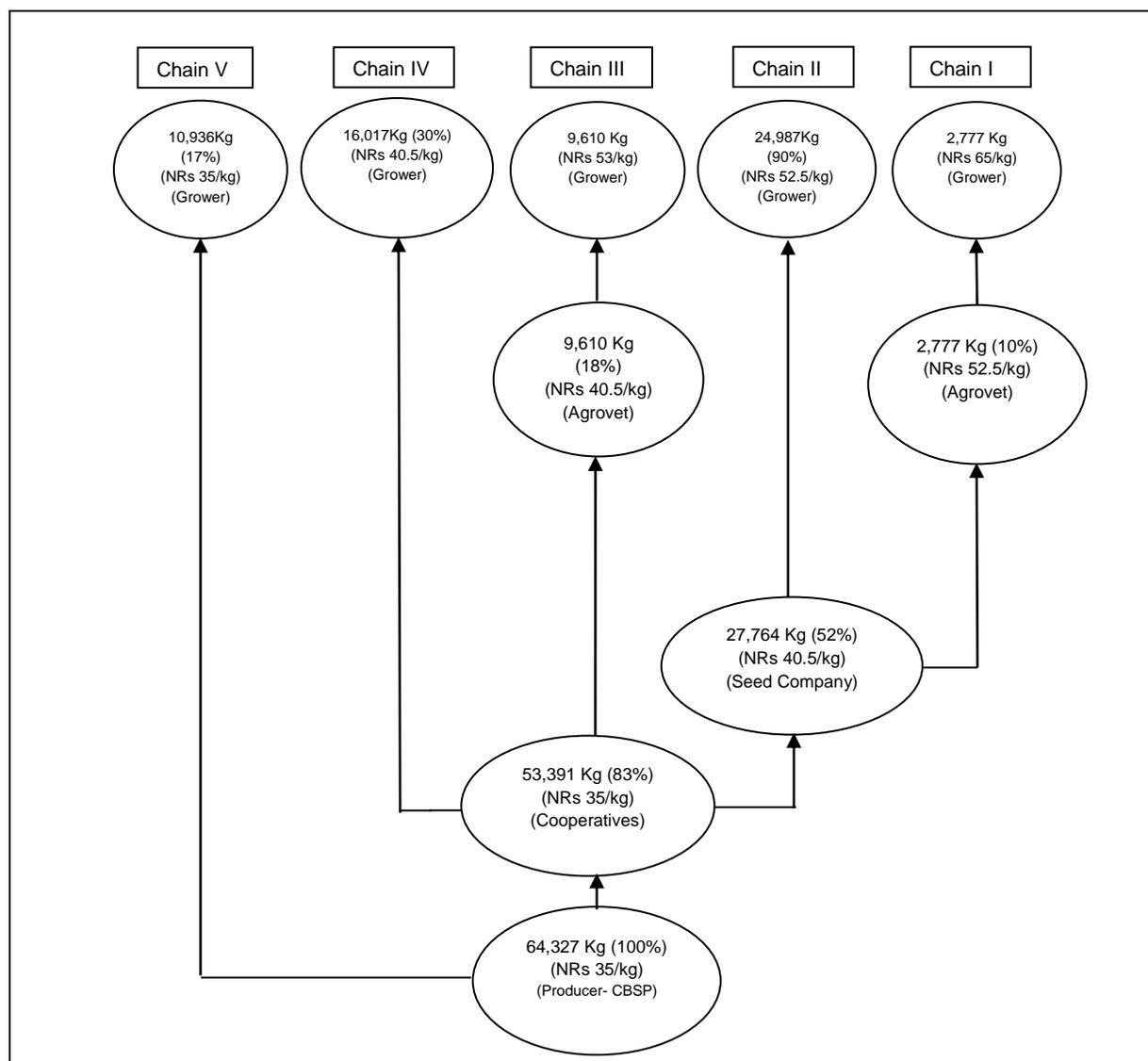
Processing and grading. Processing was carried out mainly to separate inert materials from the seed lot, whereas grading was done to sort seed into different lots, each of which with substantially uniform quality characteristics. The presence of a grading system makes possible a comparison of values of different qualities of a product in a single market and of differences in price of the same grade in different markets. After collecting the seed from the producer it was processed and graded (mostly manually) at the collector level. Grading was done mainly on the basis of size and color of seed. Sunken and broken seeds were removed during processing.

Packaging and labeling. Packaging and labeling are very important functions in seed marketing. Packaging provides product safety and offers a presentable form to consumers; labeling provides required information to the consumers about the produce. While collecting seed from producers up to the collectors' point, seed was packed into ordinary gunny bags of varying sizes ranging from 25 to 50 kilograms (kg). Packaging at the wholesaler level was also done in gunny bags and at the retailer level mostly in cotton cloth bags (1 to 10 kg). Before marketing, each sac/bag of seed was truthfully labeled, complying with the conditions set by the Seed Act and Seed Regulation of Nepal. It was noticed that truthful labeling was made mandatory to ensure tracking of producer or seller, in case of any malpractices.

Seed storage. Proper storage of seed at good facilities is an important feature of efficient marketing. To maintain longer viability, seed should be stored in a well-ventilated and damp-proof room. In general, due to lack of proper storage facilities, seed producer farmers usually sell seed immediately after harvest at lower rates; however, some farmers store seed in metal bins or in gunny bags until traders come. In regard to the sample traders, seed at the collector level was stored in metal seed bins; whereas at the wholesalers' level it was stored in large size gunny bags (40-50 kg) and at the retailer level some seed is stored in small drums and some in 1-10 kg cloth or plastic bags.

Seed trading. Three types of seed traders were found in the study area – collectors, wholesalers and retailers. It was inferred that the collectors (mostly cooperatives) collected seed from producers; community seed banks/private seed companies performed wholesaling; and agrovets and some groceries retail seed at the local level. It was observed that the collectors assembled seed (53.4 tons) from seed producers. After processing and packaging, seed was sold to wholesalers (27.8 tons), retailers (9.6 tons) and directly to seed users/consumers (16.0 tons), either purchased or distributed by government organizations such as District Agriculture Development Office (DADOs), Village Development

Figure 1. Maize seed marketing chains and flow of seed volume in the study area (2012-2013).



Exchange rate: 1 US\$=Nepalese Rupees (NRs) 95.0

Committee (VDCs) (GOs) and international/national non-governmental organizations (I/NGOs). Of the total seed traded by the wholesalers, about 25.0 tons was directly distributed to maize grower farmers through GOs and I/NGOs and the remaining 2.8 tons was purchased by the maize grower farmers through agrovet (Figure 1).

Marketing Chains

The results show five major maize seed marketing chains. Chain I involved producers, collectors, wholesalers, retailers and consumers; Chain II involved producers, collectors, wholesalers and consumers; Chain III involved producers, collectors, retailers and consumers; Chain IV involved producers, collectors and consumers; and Chain V involved producers and

consumers. A total of 64.3 tons of improved maize seed was marketed through these market actors. It was observed that of the total traded quantity of seed, about 83per cent was sold/distributed through formal chains (cooperatives, seed companies, agrovet). Trading of maize seed through identified market chains is presented in Table 1.

It may be observed from Table 1 that Chain II was the most important supply chain, accounting for 38.8per cent (25 tons) of total marketed seeds and Chain I was least important, accounting for only 4.3per cent (2.8 tons).Likewise, Chain IV accounted for 24.9per cent, Chain V accounted for 17.0per cent and Chain III accounted for 15.0per cent of the total marketed seed volume.

Table 1. Disposal of improved maize seed through identified Chains

Chain	Marketing chain actor	Quantity of seed flow (kg)	% of total quantity
I	Producer to Collector to Wholesaler to Retailer to Consumer	2,777	4.3
II	Producer to Collector to Wholesaler to Consumer	24,987	38.8
III	Producer to Collector to Retailer to Consumer	9,610	15.0
IV	Producer to Collector to Consumer	16,017	24.9
V	Producer to Consumer	10,936	17.0
	Total	64,327	100.0

Table 2: Price received by producer, marketing cost, margin of profit, price paid by consumer in the identified market chains (Amount in NRs/kg)

Market intermediaries	Chain I		Chain II		Chain III		Chain IV		Chain V	
	Amount	% Share	Amount	% Share	Amount	% Share	Amount	% Share	Amount	% Share
Price received by producer	35.00	53.8	35.00	66.7	35.00	66.0	35.00	86.4	35.00	100.0
Total marketing cost	17.50	26.9	11.50	21.9	9.00	17.0	3.00	7.4	-	0.0
Total margin of profit	12.50	19.2	6.00	11.4	9.00	17.0	2.50	6.2	-	0.0
Price paid by consumer	65.00	100.0	52.50	100.0	53.00	100.0	40.50	100.0	35.00	100.0

The larger proportion of seed sold through Chain II was probably due to large quantities of seed purchased and distributed by GOs and I/NGOs to maize grower farmers under their program such as conducting result and method demonstrations and a seed for food security program.

The GOs and I/NGOs normally purchase seed just before sowing time from the seed companies when there is no seed available at the farmer level but still available at these seed companies. Another reason was GOs and I/NGOs prefer to purchase seed from formal institutions such as cooperatives and seed companies rather than from CBSP groups and agrovets to maintain transparency and to collect large quantities of seed from one place, even if the price is relatively higher than the other organizations. A comparatively lower proportion of sales through Chain I (4.3per cent) was due to the fact that the majority of farmers have very limited information about agrovets selling maize seed. More importantly, the presence of agrovets is very limited in the hills and they prefer to sell hybrid seed rather than open pollinated varieties because they fetch higher profits with hybrids.

Price Spread

The price spread comprises all details of various marketing costs as well as the margin of profit taken by market intermediaries present in the marketing chains at subsequent stages. The price spread in the marketing of maize seed in the study area was worked out and presented in Table 2.

Average price per kg received by producers in all chains

was NRs 35 (Table 2). On average, the price paid by consumers was highest in Chain I (NRs 65/kg) and lowest in Chain V (NRs 35/kg). The price per kg paid by consumers in chains II, III and IV was NRs 52.5, 53.0 and 40.5, respectively. The producers' share in consumers' rupee varied from 53.8per cent to 100per cent. Cent per cent of producers' share in consumers' rupee in Chain V was mainly due to the fact there were no market intermediaries involved in this chain, seed was directly purchased by or reached to consumers from producers; therefore, no marketing costs and margins were incurred to the consumers' price. This finding is similar to Joel et al.(2013) where they observed highest producer share to consumer price (94 per cent) in similar maize grain chain "producers to final consumers" and reported due to the fact that market intermediaries who pocketed the producer share were eliminated along the maize grains supply chain. The lowest price spread was observed in Chain I, where the producer received 53.8percent of the amount paid by the consumer (NRs 35 out of NRs 65/kg). This was due to higher marketing costs (26.9per cent) and margins (19.2per cent) incurred by market intermediaries. Similarly, the producers' share in consumer rupees in chains II, III and IV was 66.7per cent, 66.0per cent and 86.4per cent, respectively (Table 2).

Per kg seed marketing costs varied from NRs 3.0 (Chain IV) to 17.5/kg (Chain I), accounting for 7.4 per cent and 26.9 per cent of consumers' prices in respective chains (Table 2). Per kg marketing margin taken by intermediaries varied from NRs 2.5 (Chain IV) to NRs 12.5/kg (Chain I), which accounted for 6.2per cent and 19.2per cent of the price paid by the consumer in respective chains. It is also worth pointing out that

Table 3. Marketing costs at market intermediaries in the identified chains (Amount in NRs/kg)

Market intermediaries	Chain I		Chain II		Chain III		Chain IV		Chain V	
	Amount	% Share	Amount	% Share	Amount	% Share	Amount	% Share	Amount	% Share
Collector	3.00	17.1	3.00	26.1	3.00	33.3	3.00	100.0	NA	NA
Wholesaler	8.50	48.6	8.50	73.9	-	-	-	-	NA	NA
Retailer	6.00	34.3	-	0.0	6.00	66.7	-	-	NA	NA
Total added costs	17.50	100.0	11.50	100.0	9.00	100.0	3.00	100.0		

Table 4. Marketing costs on various marketing functions in the identified chains (Amount in NRs/kg)

Cost item	Chain I		Chain II		Chain III		Chain IV		Chain V	
	Amount	% Share	Amount	% Share	Amount	% Share	Amount	% Share	Amount	% Share
Load/ unload charge (handling)	1.15	6.6	0.65	5.7	0.75	8.3	0.25	8.3	NA	NA
Transportation charges	8.10	46.3	5.35	46.5	4.25	47.2	1.50	50.0	NA	NA
Processing and grading charges	1.25	7.1	0.75	6.5	0.75	8.3	0.25	8.3	NA	NA
Packaging including material	4.50	25.7	3.25	28.3	2.00	22.2	0.75	25.0	NA	NA
Storage charges	2.50	14.3	1.50	13.0	1.25	13.9	0.25	8.3	NA	NA
Total added costs	17.50	100.0	11.50	100.0	9.00	100.0	3.00	100.0		

retailers sold the seed at a comparatively higher rate that is NRs 65/kg compared to wholesaler (NRs 52.5/kg) and collector (NRs 40.5/kg). It was mainly due to the fact that the retailers sold the seed in small quantities and were required to retain the seed for a longer period of time which involves incurring higher risk.

Marketing Cost

It may be observed from the analysis that no marketing cost and margin was incurred in Chain V because seed was directly purchased by or reached to consumers from seed producers; no market intermediaries were involved in this chain (Table 3). Per kg marketing cost incurred by various market intermediaries was analyzed at NRs 17.5, 11.5, 9.0 and 3.0 in chains I, II, III and IV, respectively. It was observed that wholesalers' marketing cost was relatively high (NRs 8.5/kg), which accounted for 48.6per cent and 73.9per cent of the total costs in Chain I and II, respectively. The lowest marketing cost was observed at the collector level (NRs 3.0/kg), which accounted for 17.1per cent, 26.1per cent, 33.3per cent and 100per cent of total cost in chains I, II, III and IV, respectively. Retailers' marketing cost was NRs 6.0/kg, which accounted for 34.3per cent and 66.7per cent of the total cost in chains I and III, respectively. Higher wholesalers' marketing cost was mainly due to higher transportation costs and seed packaging, including materials (Table 3 and Table 4).

Per kg marketing cost incurred carrying out various marketing functions by market chain is presented in Table 4. An item-wise analysis indicated that the cost of transportation accounted for the highest share – on average 47.5per cent (NRs 1.5 to 8.1/kg) of the total marketing cost in the identified chains. The cost of the load-unload charge accounted for the lowest; on average 7.2per cent (NRs 0.25 to 1.15/kg) of total marketing cost in the identified chains. Other major marketing cost items

were: the cost of packaging (including materials), on average accounted for 25.3per cent (NRs 2.6/kg); storage charges (12.4per cent or NRs 1.4/kg), and processing and grading costs– 7.6per cent or NRs 0.75/kg in identified chains (Table 4).

Marketing Margin

The marketing margin is also an indicator of the efficiency of the marketing system. The larger the value of marketing margins the greater the inefficiency in the marketing system. On the other hand, if the goods move from producers to consumers at minimum cost, the marketing system can be said to be efficient. However, in such a situation the sustainability of the marketing system might remain questionable.

Per kg gross margin was NRs 34.2, 21.7, 22.2, 9.7 and 4.2 in chains I, II, III, IV and V, respectively (Table 5). Retailers' gross margin was highest (NRs 12.5/kg), which accounted for 36.5per cent and 56.2per cent of the total gross margin in chains I and III, respectively. Gross margin by intermediaries showed that producers incurred the lowest margin NRs 4.2/kg (on top of cost of production) accounted for 12.4, 19.5, 19.1, 43.6 and 100per cent of total gross margin in chains I, II, III, IV and V, respectively. Per kg gross margin of seed collectors and wholesalers was calculated to be NRs 5.5 and 12.0, respectively. The higher retailer margin was mainly due to the fact that the disposal of seed at the retail level was slow, as well as in small quantities and storage problems compared to collectors and wholesalers, resulting in comparatively higher risk and loss.

Per kg total net marketing margin (margin of profit) was NRs 16.7, 10.2, 13.2, 6.7 and 4.2 in chains I, II, III, IV and V, respectively (Table 5). As explained below in gross margin, retailers' net margin was relatively high (NRs 6.5/kg), which accounted for 38.8per cent and 49.1per

Table 5. Gross and net margins at various market actors in the identified chains (Amount in NRs/kg)

Market intermediaries	Chain I		Chain II		Chain III		Chain IV		Chain V	
	Amount	% Share	Amount	% Share	Amount	% Share	Amount	% Share	Amount	% Share
Total gross margin (GM)	34.25	100.0	21.75	100.0	22.25	100.0	9.75	100.0	4.25	100.0
Producer	4.25	12.4	4.25	19.5	4.25	19.1	4.25	43.6	4.25	100.0
Collectors	5.50	16.1	5.50	25.3	5.50	24.7	5.50	56.4	-	-
Wholesalers	12.00	35.0	12.00	55.2	-	-	-	-	-	-
Retailer	12.50	36.5	-	-	12.50	56.2	-	-	-	-
Total net margin (margin of profit)	16.75	100.0	10.25	100.0	13.25	100.0	6.75	100.0	4.25	100.0
Producer	4.25	25.4	4.25	41.5	4.25	32.1	4.25	63.0	4.25	100.0
Collectors	2.50	14.9	2.50	24.4	2.50	18.9	2.50	37.0	-	-
Wholesalers	3.50	20.9	3.50	34.1	-	-	-	-	-	-
Retailer	6.50	38.8	-	-	6.50	49.1	-	-	-	-

Table 6. Index of marketing efficiency in the identified market chains

Item	Chain I	Chain II	Chain III	Chain IV	Chain V
Consumers price (NRs/kg)	65.00	52.50	53.00	40.50	35.00
Total marketing costs and margin of profit (NRs/kg)	34.25	21.75	22.25	9.75	4.25
Marketing Efficiency (Index)	0.90	1.41	1.38	3.15	7.24

cent of total net margin in chains I and III, respectively. The lowest net margin was charged by collectors (NRs 2.5/kg) accounted for 14.9, 24.4, 18.9 and 37.0 per cent of total net margin in chains I, II, III and IV, respectively. Low net margin at the collector level might be due to competition between seed collectors.

Marketing Efficiency

The marketing efficiency is directly related to the cost involved to move produce from the producer to the consumer and required services provided or desired by the ultimate consumers. If the cost compared with the services involved is low, such marketing said to be efficient and vice-versa. More importantly, any improvement that reduces the cost of a particular function without reducing consumers' satisfaction indicates an improvement in the marketing efficiency. Highest marketing efficiency with magnitude of 29.05 in maize grain chain "producers to final consumers" was influenced by elimination of market intermediaries from the chain (Joel et al., 2013).

The results presented in Table 6 revealed that highest marketing efficiency index (7.24) was in Chain V (producer to consumer), followed by Chain IV (producer to wholesaler to consumer) with a marketing efficiency index of 3.15, followed by Chain II (producer to retailer to consumer) with a marketing efficiency index 1.41, followed by Chain III with a marketing efficiency index of 1.38 and lastly Chain I (producer to wholesaler to retailer to consumer), with a marketing efficiency index of 0.9. The highest marketing efficiency in Chain V was mainly due to an absence of market intermediaries, since

consumers either purchased or received seed directly from producers or suppliers (GOs or I/NGOs). However, it was observed that the higher proportion of maize seed was marketed through Chain II (38.8 per cent of total seed transaction). It must be probably due to the fact that there were larger number of CBSP-managed co-operatives (seed collector) in the study area and the consumers were of the opinion that the seed purchased from cooperatives assured quality of seed.

CONCLUSION

Maize seed production through the CBSP approach in Nepal can be considered a means to disseminate improved seed in remote areas. The CBSP groups are helping solve the problem to supply quality seed on time in demanded quantities. So the government must meet the growing need to up-scale and out-scale the CBSP approach to produce quality seed under the agriculture extension service system of the Department of Agriculture, Nepal.

Seed marketing through formal chains (83 per cent) is quite satisfactory and the market chain is being developed, although there is potential for even more. Of the identified five seed marketing chains, the cheapest rate of seed (NRs 35/kg) was purchased in Chain V (market efficiency 100 per cent). This is obvious since there were no market intermediaries present; seed was directly purchased or obtained by consumers from the producers. However, sustainability of this market chain might be at question in the absence of market intermediaries in such direct transactions. So, previewing

the market sustainability at least one market intermediary should be involved between producer and consumer as in Chain IV (producer to collector/cooperative to consumer) where the market efficiency index (3.15) was in second rank. The Government of Nepal (GoN) is also giving high priority to establish cooperatives in remote areas for this type of business.

A higher magnitude of gross marketing margin is not only an additional burden on consumers but also an injustice to the producers who do not get a reasonable benefit from their produce and ultimately may have an adverse effect on production.

The largest unit profit (NRs 6.5/kg) which was observed at the retailer level should be reduced by introducing a safety cushion such as an insurance policy. The provision of counterpart insurance premium from government to seed producers on crop failure caused by natural calamities like drought, hailstones, landslides and floods and subsidies to seed traders for transport, tax exemption on processing and grading equipment import, advertisement and provision of financial loan against seed stock could help in lowering the surcharge on seed.

Overall, the maize seed marketing scenario indicated that on average 25.4 per cent of the consumers' price was absorbed in the marketing chains in meeting out the various marketing costs (14.6 per cent) and margin of profit of traders (10.8 per cent), and 74.6 per cent of consumers' price reaches in the hands of the seed producer farmers. Of the total amount received by seed producers, about 40.6 per cent is spent on seed production to cover variable and fixed costs and 6.8 per cent of the amount was spent on marketing costs, leaving only about 9 per cent as a margin of profit to cover enterprise risks. The main reason for the comparatively lower price obtained by the seed producers on the one hand and higher prices paid by the consumers on the other hand, is due to the existence of a large number of market intermediaries resulting in a larger magnitude of gross marketing margins. Furthermore, seed producers spent a substantial amount of time and huge resources, as well as taking higher risks to produce seeds. But their share in total profit is small. On the other hand, compared to seed producers, seed collectors, wholesalers and retailers spent relatively less time and invested fewer resources, but they received large profits. In reality, producers are getting a low price, consumers are paying high prices and most benefits go to traders. Profits at the producer level could be increased by providing a counterpart subsidy from the government to cover some portion of marketing costs at the trader level.

Several findings show that fewer actors in the seed marketing chain reduce the retail price. It can benefit both producers and consumers. One way to reduce the

number of actors is to directly link producers to consumers. Another way to benefit both producers and consumers is by increasing the number of traders, which will increase market competition and reduce the monopoly power of a few traders. This requires investment in infrastructure, market information, capacity building of seed producing groups, and establishing linkage between producers' groups and seed traders.

According to several empirical findings, the market intermediaries reduce marketing efficiency of seed along the supply chain. Therefore, it is the role of the government to eliminate market intermediaries along the seed supply chain who pocketed a large share of the margins of seed producers. However, an optimum number of market intermediaries is required for the sustainability of the seed marketing system. Seed producers could maximize their margins if government intervenes proactively in order to establish/organize and streamline the seed marketing cooperatives and federations. Producers could then use these federations to sell their seed at better profit through spot and contract seed production.

ACKNOWLEDGEMENT

Great appreciation to Hari P. Sharma, Kiran Basnet, Sabitri Dhakal, Anju Pandey, Kamala Sapkota, Santosh Rasaily, Sunil Chaudhary, Shanti Pandey, Abiskar Gyawali, Prameela Awale and Urmila Adhikari for their cooperation in conducting the interviews. Immense thanks to Ambika Pandey for her great support in data compilation. Special thanks to Dr. H. N. Bhandari for his critical inputs and valuable suggestions. Sincere thanks to Dr. B. M. Prasanna for his encouragement and continuous support while carrying out this study. Finally, great thanks to survey respondents and HMRP partners for their cooperation accomplishing this study.

REFERENCES

- Joel C, Vasudev N, Suhasini K (2013). Marketing efficiency of agri-food along the agri-food supply chain in Tanzania, International Researchers. 2(1):127:131 www.iresearcher.org. Accessed June 5, 2014.
- Dilli KC, Ortiz-Ferrara G, Gadal N, Gurung DB, Pokharel S (2011). Economics of maize seed production, marketing and value chain system under CBSP system in the Hills of Nepal. 11th Asian Maize Conference, CIMMYT Intl., Nanning, China.
- Dilli KC (2011). Time series analysis of growth rates of area, production, and productivity of major cereal crops of Nepal. Annual Review Meeting, Hill Maize Research Project, Nepal.

- Dilli KC (2013). Maize seed production and marketing: A value chain analysis (in Nepali Language). *Our Heritage*. 4:9-13.
- Dilli KC (2013). Maize seed production communities in hills towards a new path of contract seed production in Nepal. *Agronomy Journal of Nepal*. 3:151-156.
- Dilli KC, Gadai N, Sadananda AR, Boeber C, Koirala KB, Neupane SP, Khatiwada B, Basnet K (2013). Value chain analysis of community based maize seed production in the hills of Nepal. 12th Asian Maize Conference, CIMMYT Intl., Bangkok, Thailand.
- MacRobert JF (2009). Seed business management in Africa. Harare, Zimbabwe, International Maize and Wheat Improvement Center (CIMMYT); 2009.
- Ministry of Agricultural Development, Nepal. (2013). Statistical Information on Nepalese Agriculture; 2013.
- Lilian K, Nicholas S, Jayne TS, Francis K, Milu M, Megan S, James F, Gilbert B (2011). A farm gate-to-consumer value chain analysis of Kenya's maize marketing system. Michigan State University, Working Paper No. 111.
- Prasad J (1989). Marketable surplus and market performance: A Study with Special Reference to

Muzaffarpur Food-grain Market in Bihar, India. Mittal Publications, New Delhi; 1989.

Project for Agriculture Commercialization and Trade (2012). Value Chain Development Plan for Cereal Seed., MoAD, Nepal; 2012.

Accepted 10 December, 2014

Citation: KC Dilli Bahadur, Gadai N, Neupane SP, Puri RR, Khatiwada B, Ortiz-Ferrara G, Sadananda AR, Böber C. (2015). Maize seed marketing chains and marketing efficiency along supply chains of the hills in Nepal. *International Journal of Agricultural Marketing*, 2(1): 026-033.



Copyright: © 2015. Dilli et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are cited.