Baseline survey report on the structure, conduct and performance of pearl millet and sorghum markets in Niger

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Summary

Providing improved technologies for increased marketable produce surpluses and proposing market strategies to farmers is viewed as a valuable development intervention. The HOPE project adheres to this framework, and the objective of the present baseline market study is to characterize the existing marketing channels of pearl millet and sorghum grains in Niger and identify the channels which can be arranged innovatively for producers to get better grain prices. The study employs the structure, conduct and performance paradigm for the purposes of describing market actors and marketing channels, and analyzing prices and marketing margins. During the period January 8-27, 2011, 89 market actors were surveyed in 9 major grain markets located in the intervention zone of the HOPE project in Niger.

The results indicated that the major source of supplying the market actors with pearl millet grains was from the individual producers. Seven marketing channels co-existed for the pearl millet grain marketing: (1) Individual producers-Assemblers-Wholesalers-Retailers-Consumers; (2) Individual producers-Wholesalers-Retailers-Consumers; (3) Individual producers-Assemblers-Retailers-Consumers; (4) Individual producers-Retailers-Consumers; (5) Producer groups-Retailers-Consumers; (6) Individual producers-Processors; and (7) Individual producers-Assemblers-Wholesalers-Processors. Producer price levels were lower in the long marketing channels (146-151 F/kg in the channels 1, 2, 3 and 7) than in the short marketing channels (151-160 F/kg in the channels 4, 5 and 6). The highest producer price levels corresponded to sales by producer groups to retailers and direct sales by individual producers to processors whereas the use of these two marketing channels (5 and 6) was found marginal. Marketing channel 5, where producer organizations were the suppliers of pearl millet, performed the lowest marketing margins. The results on sorghum market were quite similar to those on pearl millet market.

Since collective marketing has been revealed ensuring a good payment to producers and a fair transaction with producers' trading partners, and that processors are interested in improved grain varieties for better quality and price for their processed products, it is hypothesized that arranging for the marketing of improved grain varieties between producer organizations and processors will be efficient. The marketing linkage between producer organizations and processors through contractual arrangements will let producers perceive the advantages of collective marketing and get incentives for doing so while processors also benefit. It will guarantee the flow of products with special requirements, coordinate product delivery, reduce uncertainty about product quality for processors, and lower income risks for producers. Thus, it is suggested to the HOPE project to investigate this line of development research.

Key words: HOPE project, market access, marketing channel, structure conduct and performance.

1. Introduction

Understanding the functioning of agricultural markets has long been crucial for research practitioners and policy makers to determine niche markets and identify specific market requirements which specific sellers should meet to stay in business and make sustainable profits. This gains significance for developing countries, especially for Sub-Saharan African countries, where markets are considered not working well for farmers (Kherallah et al., 2002). As pointed out by Gabre-Madhin (2006), "the fundamental market problem in the twenty-first century is to understand how markets function, what roles different institutions play in supporting market exchange, and how to design, transfer, and maintain these institutions". This call is to work toward getting the right institutions for getting markets right. In this line, Barrett (2008) demonstrates that the access to improved technologies and productive assets stimulates smallholder market participation and escape them from semi-subsistence poverty traps. Thus, providing improved technologies for increased marketable produce surpluses and proposing market strategies to farmers become a valuable development intervention.

The HOPE project aims to contribute to the increase in the productivity of pearl millet and sorghum in Sub-Saharan African cereal-based production systems in order to improve household incomes and food security. The project intends to promote high-productivity technologies such as improved varieties through innovative systems of diffusion. The implementation of this five-year project starts in Niger in 2009. It is important to assess the baseline market situation of pearl millet and sorghum grains before measuring any impact of the project. The baseline market situation will help to characterize the existing marketing channels of pearl millet and sorghum grains and identify the channels which can be arranged innovatively for producers to get better grain prices which will ensure better revenues since grain quantities will increase with the adoption of the improved varieties.

The remainder of this report proceeds as follows. Section 2 provides an overview of the HOPE project and the grain market in Niger. Section 3 briefly reviews the traditional Structure-Conduct-Performance paradigm for market study and describes the procedure for data collection and the data sources. Section 4 regards the results on the pearl millet and sorghum markets. Section 5 contains a discussion of strategic market-oriented actions for the implementation of HOPE. Section 6 concludes.

2. Background

Niger, as one of the eight countries of the Sahel region of West Africa, often experiences a challenging agricultural production because of the arid climate, recurrent droughts and erratic rains. Agriculture employs more than 80 percent of the total population and contributes approximately 40 percent to Gross Domestic Product (GDP). The main cereals cultivated are millet, sorghum, rice, fonio and maize. Cereals represent key staple crops for the national program called Initiative 3N which intends to alleviate food insecurity and malnutrition, and therefore, is interested in increasing agricultural productivity, ensuring regular supply of main foods on the markets and improving their accessibility to all social groups including the vulnerable smallholder farmers.

The "Harnessing Opportunities for Productivity Enhancement of Sorghum and Millets in Sub-Saharan Africa and South Asia" (HOPE) Project envisions an integrated value chain analysis to increase the productivity of sorghum and millet production systems in Niger during the period 2009-2013. It aims to enhance the collaboration of all value chain actors to enhance access to markets, credit, seeds, inputs, and know-how in order to stimulate technology adoption that can increase the marketable produce surpluses and improve incomes, food security and livelihoods for rural households. Key project stakeholders are the farmer organizations (producer groups organized in unions/cooperatives federating in federations of producer unions). They are trained in the production of improved seeds that farmers can access to produce more and market more.

Primary actors on the market include farmers producing the bulk of the grains, traders (brokers or rural assemblers, assemblers or semi-wholesalers, wholesalers and retailers) buying the grains from the producers and selling to final consumers. Niger has just one cereal harvest period per year in October-November. Although producers—rural subsistence farmers—produce their grains individually, they can decide to sell their marketable surpluses individually or collectively through their farmer organizations. Previous studies report that the number of traders per market ranges from 24 to 353, with retailers accounting for over 50 percent of all traders; by reducing search costs, cell phone coverage is associated with reduced price dispersion across markets and reduced intra-annual price variation (Aker, 2008). Grain market studies in Niger have well documented market reforms and market integration using trader-

level data. They have not provided any appraisal of price transmission along the grain supply chain.

3. Methodology

3.1. Theoretical framework

This study employs the industrial organization paradigm which examines the structure, conduct and performance (SCP) of a market. Following the argument of Bain and his school who developed the approach, the way actors are organized in the market (the structure) tells a great deal about how they make decisions (their conduct), which in turn influences the level of efficiency and fairness present in the market (their performance).

The method elaborates on three parts (Clodius et Mueller, 1961; Scherer, 1980). Structure regards the characteristics of the organization of the market, which can influence strategically the formation of market price; the existing marketing channels and institutions defining the rules of the game relate to the market structure. Conduct relates to how the market actors operate (i.e. their price strategies). Performance is about the economic results of the functioning of the market; this is studied through market integration (following dynamic/temporal considerations) or margins analysis (following static/spatial considerations); while market integration focuses on the extent to which demand and supply shocks arising in one location are transmitted to other locations (Fackler and Goodwin, 2001), margins analysis—standing for market efficiency—rather focuses on the extent to which prices of homogeneous goods sold at different locations are equal, net of transaction costs (Barrett and Li, 2002).

A number of applications of the SCP framework exist in the literature, but they mix the evidence to predict the real performance from real structures, and vice-versa, as well as the determination of behavior (conduct) from the structures (Harris and al., 1995). This gives rise to a holistic approach based on the interrelations between the market actors. Although such an institutional method for analyzing markets is promising, this study adopts the SCP model for the purposes of describing market actors and marketing channels, and analyzing prices and marketing margins.

3.2. Empirical process

During the period January 8-27, 2011 in Niger, a short survey of 9 markets was done in Niger. These markets were selected by the National Agricultural Research Institute INRAN on the basis that they represent the major grain markets in the intervention zone of the HOPE project in

Niger. In each market, about 9 to 10 actors commercializing pearl millet and sorghum were randomly interviewed to collect data mainly on quantities traded, prices, transportation costs and storage costs. In total, there were 89 market actors of different types: producers, assemblers, wholesalers, retailers, processors, consumers and exporters (Table 1). The market actors surveyed were mainly male. Producers, representing 7% of the sample, were encountered in one third of the markets surveyed. Assemblers, representing 21% of the sample, were present in two-thirds of the markets surveyed. Wholesalers and retailers, representing 29% and 39% of the sample, respectively, were encountered in all the markets visited except in Niamey. Processors, consumers and exporters were rarely encountered.

Table 1: Actors and markets surveyed in Niger

Actors	Men	Women	Total	%	Markets
Producers	6	0	6	6.74	Dantchandou, Say and Tchadoua
Assemblers	19	0	19	21.35	Dantchandou, Elkolta, Maradi, Say, Serkin Haoussa and Tchadoua
Wholesalers	26	0	26	29.21	Dantchandou, Elkolta, Falwel, Maradi, Niamey, Say, Tchadoua and Tera
Retailers	30	5	35	39.33	Dantchandou, Elkolta, Falwel, Maradi, Niamey, Say, Tchadoua and Tera
Processors	1	0	1	1.12	Niamey
Consumers	0	1	1	1.12	Say
Exporters	1	0	1	1.12	Maradi
Total	83	6	89	100.00	

The survey suffers from a low sample size and important missing figures for the market actors which were even the most represented in the sample. Therefore, additional semi-structured interviews with producers, traders and processors, have been made to complement the market survey.

The results presented below give some baseline picture of the pearl millet and sorghum markets in Niger. For each product, the market structure is analyzed through the buying partners and the selling partners of the actors surveyed, followed by the grain marketing map. Then, the conduct of the market actors is analyzed through the assessment of quantities traded and price distribution along the marketing channels identified. Finally, to match with the HOPE project's goal, performance of the grain market is assessed by the marketing margins net of

transportation and storage costs at the linkage between the producers and their trading partners along the marketing channels. Ideally, these margins are closer to the null value.

4. Structure, conduct and performance of the pearl millet and sorghum markets

4.1. The case of pearl millet market

The volume of pearl millet grains bought by an average assembler was 44.8 tons/year; three-fourths of this quantity came from individual producers; assemblers sold on average 43.7 tons/year, mainly to urban wholesalers and urban retailers (Figure 1). The volume bought by an average wholesaler was 138.2 tons/year, originating mainly from individual producers and rural assemblers; wholesalers sold on average 138 tons/year, more than two-thirds of this quantity to their wholesaler pairs and rural retailers (Figure 2). An average retailer bought 18.7 tons/year, mainly from individual producers and producer groups; retailers sold on average 16.9 tons/year, mainly to rural wholesalers and retailers (Figure 3). Interview data indicated that wholesalers could trade among themselves, and so could retailers; some wholesalers were also present in the retail market.

The processor surveyed reported buying 9.2 tons/year, only from individual producers. However, the interviews revealed that processors also bought their raw products from wholesalers who financed rural assemblers to assemble the produce from individual producers.

In definitive, for all market actors, the major source of supplying pearl millet grains was from the individual producers. This is confirmed by the different interviews made.

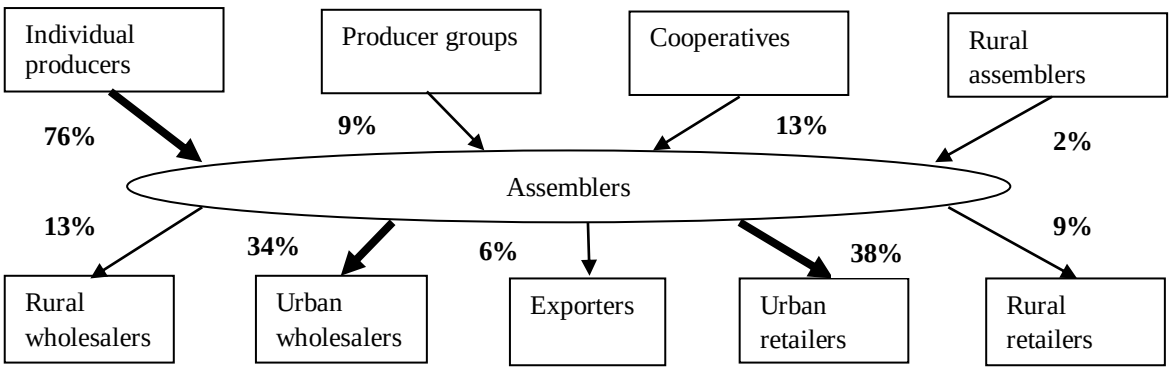

Figure 1: Buying and selling partners of pearl millet grain assemblers in Niger

Source: Baseline market survey in Niger

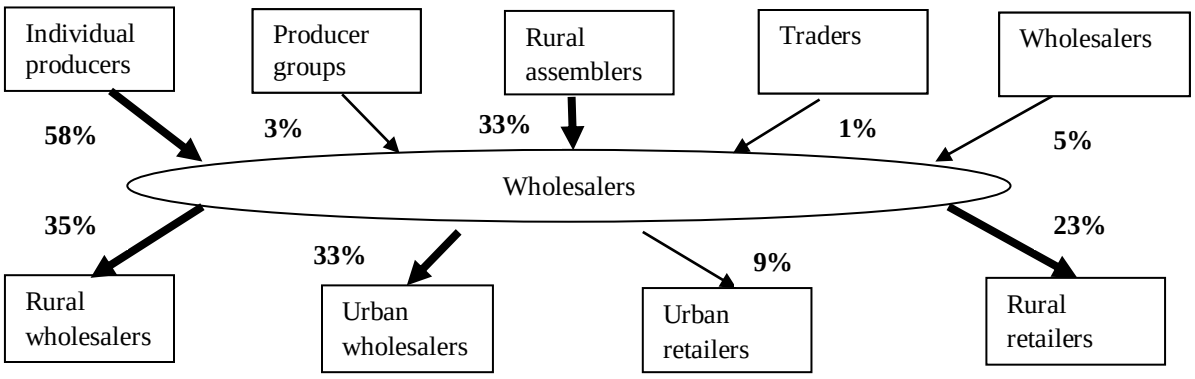

Figure 2: Buying and selling partners of pearl millet grain wholesalers in Niger

Source: Baseline market survey in Niger

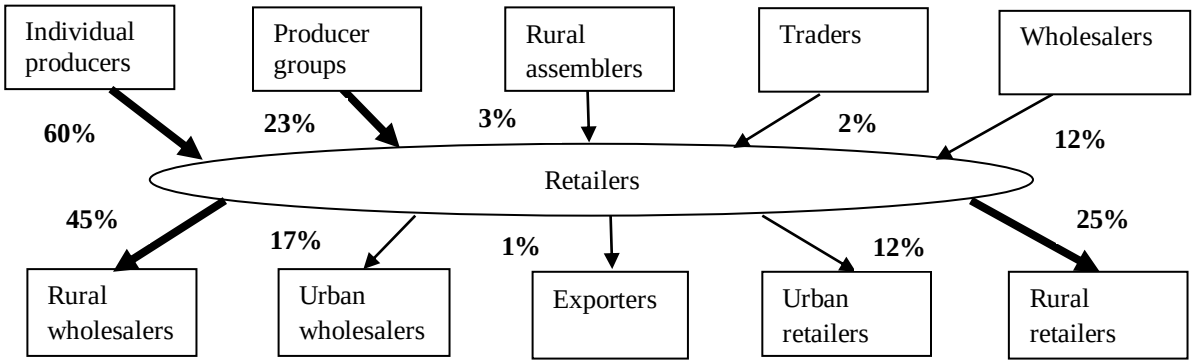

Figure 3: Buying and selling partners of pearl millet grain retailers in Niger

Source: Baseline market survey in Niger

The above description of the different product flows between the diverse actors can be summarized in Figure 4. Only were the main buying and selling partners considered.

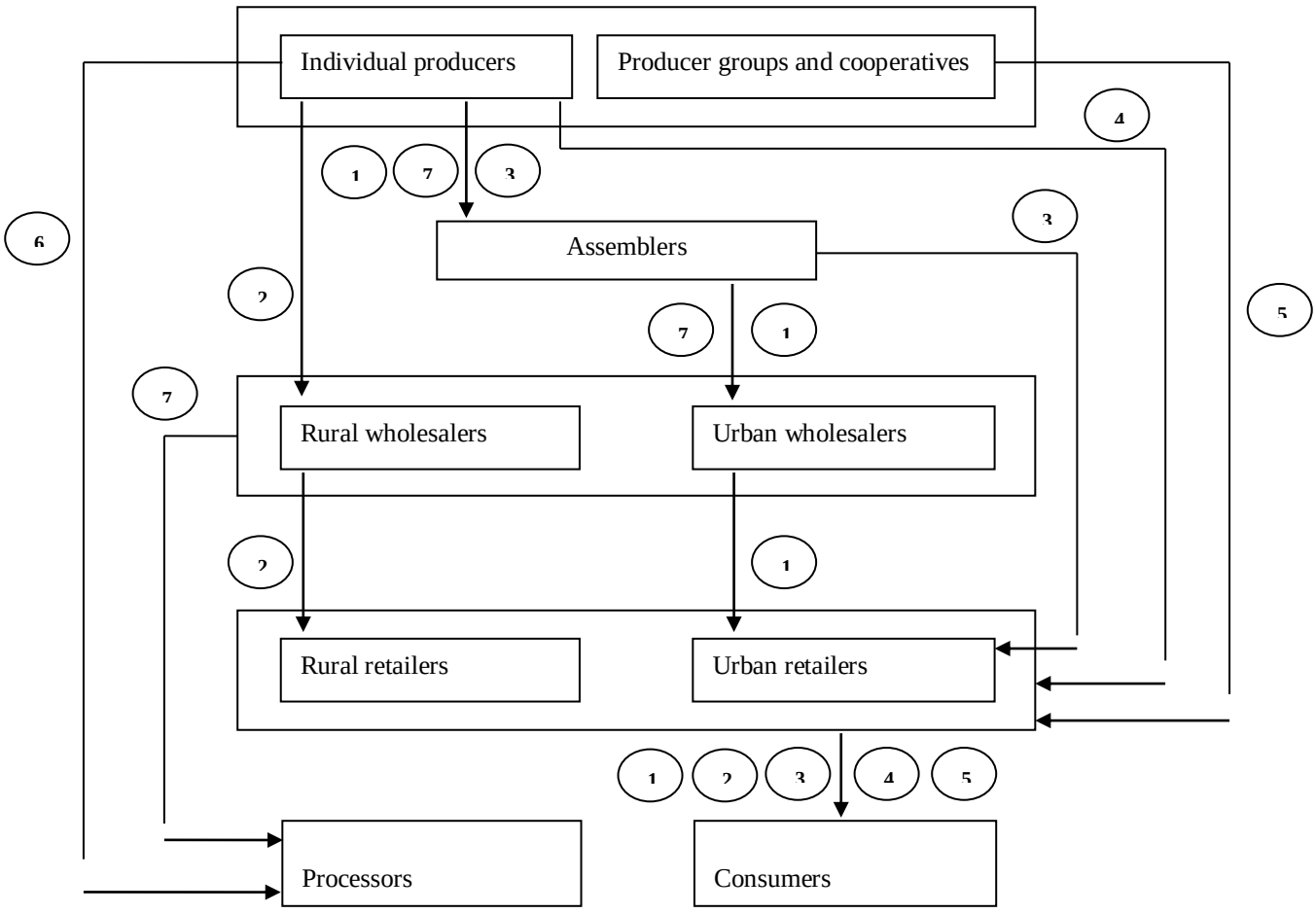

Figure 4: Pearl millet grain marketing chain in Niger.

Source: Baseline market survey and interviews in Niger

Seven marketing channels co-existed:

1) Individual producers-Assemblers-Wholesalers-Retailers-Consumers
2) Individual producers-Wholesalers-Retailers-Consumers
3) Individual producers-Assemblers-Retailers-Consumers
4) Individual producers-Retailers-Consumers
5) Producer groups-Retailers-Consumers
6) Individual producers-Processors
7) Individual producers- Assemblers-Wholesalers-Processors

The most common marketing channels were the channels 1 and 2, in which wholesalers exert market power upstream. Marketing channels 6 and 7 were the two co-existing channels supplying processors with pearl millet grains.

Quantities purchased, quantities lost during transportation and from storage, and quantities sold, are presented in Table 2 for assemblers, wholesalers and retailers. They indicate that the market actors mostly traded the local varieties of pearl millet grains rather than the improved varieties. In terms of volume traded, one wholesaler was worth three assemblers. This was confirmed by the interviews which revealed that each wholesaler funded 3 to 5 assemblers as a strategy of supply with cereal grains. During the course of marketing the grains, the actors incurred some losses due to transportation and storage. The losses were less important for wholesalers than for the other actors.

Table 2: Average quantities of pearl millet traded by the market actors

Actor	Volume bought (kg/year)			Volume lost (kg/year)	Volume sold (kg/year)
	Local varieties	Improved varieties	Total		
Assemblers	32,222	12,573	44,795	1,079	43,716
	71.9%	**28.1%**	**100.0%**	**2.4%**	**97.6%**
Wholesalers	111,088	27,077	138,165	152	138,013
	80.4%	**19.6%**	**100.0%**	**0.1%**	**99.9%**
Retailers	17,190	1,554	18,744	1,812	16,932
	91.7%	**8.3%**	**100.0%**	**9.7%**	**90.3%**

Source: Baseline market survey in Niger

Price distribution along the marketing channels identified (Figure 5) show that producer price levels were lower in the long marketing channels (146-151 F/kg in the channels 1, 2, 3 and 7) than in the short marketing channels (151-160 F/kg in the channels 4, 5 and 6). Note that these price levels apply only to January (the survey period). Interviews revealed that prices were variable and followed the cropping season. At harvest times (September-December), pearl millet grain is purchased from producers at an approximate price of 130 F/kg. At post-harvest times (from January-March to April-June and July-September), price increases gradually.

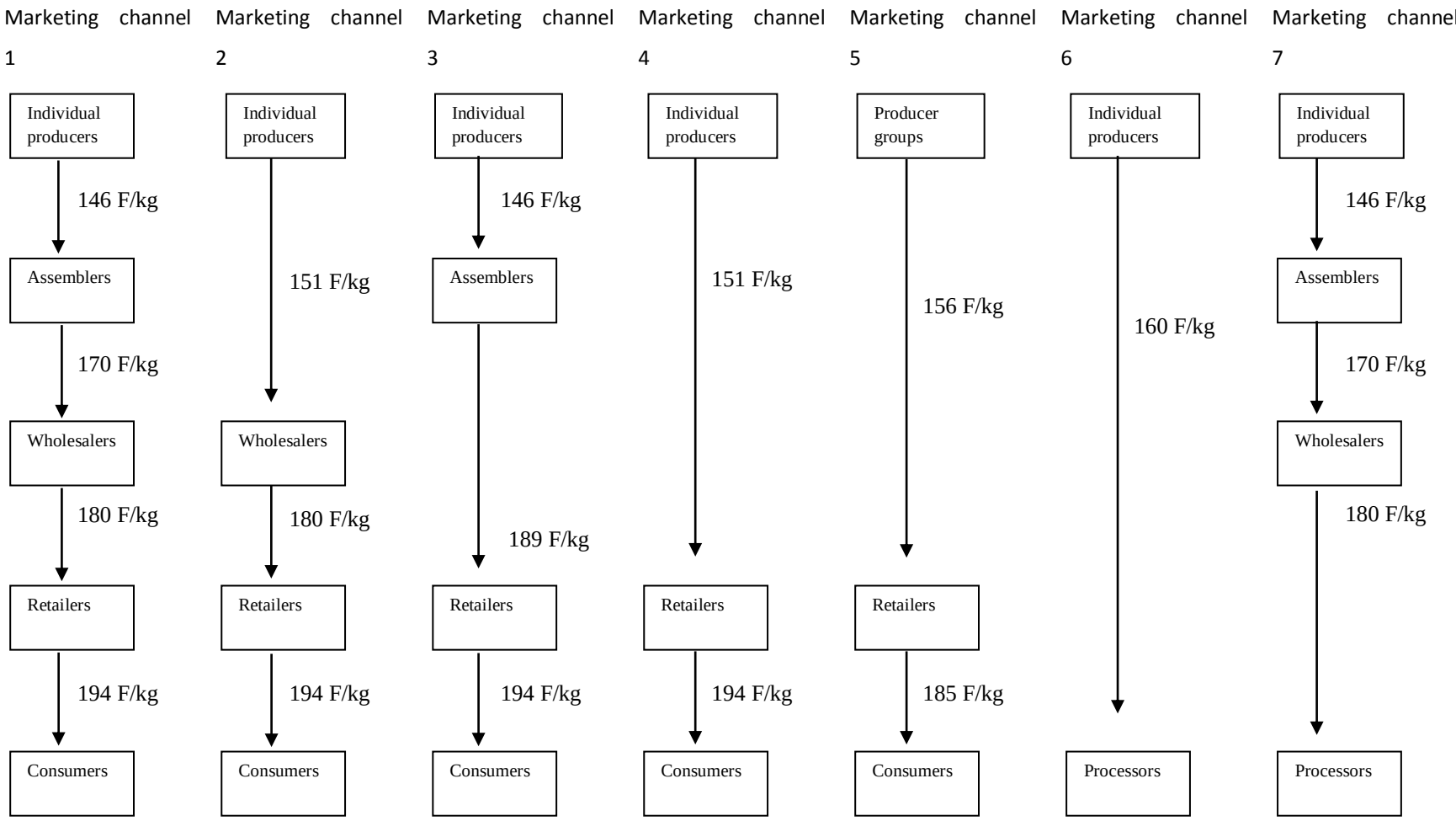

Figure 5. **Price transmission along the pearl millet grain marketing channels in Niger**

The highest producer price levels corresponded to sales by producer groups to retailers and direct sales by individual producers to processors whereas the use of these two marketing channels (5 and 6) was found marginal. Of the cases where the grain end-user is the processor, marketing channel 6 appeared better-paying for producers than marketing channel 7.

A key feature of marketing channel 6 was about the specific marketing of improved pearl millet varieties. From the interviews, processors often require the pearl millet variety HKP (red pearl millet). Quality of pearl millet grains influences very much quality of the processed products. Processors grade quality of the grains through the product homogeneity in terms of the variety and the low degree of impurities. In the marketing channel 6, processors ensure some product homogeneity at the cost of travelling to various and different locations to buy the grains of improved pearl millet varieties, and without ensuring low impurities in the grain packs. In the marketing channel 7, assemblers and wholesalers ensure low impurities in the grain packs for processors, but a blend of local and improved varieties, thereby not satisfying the product homogeneity.

Hence, producer-processor linkage can be advised as it ensures better payment to producers and product homogeneity to processors. Notwithstanding, much has to be done for processors: ensuring low transaction costs and better product homogeneity by buying the whole quantities needed in few specific locations and ensuring low impurities in the grain packs.

Beyond producer prices, marketing margins net of transaction costs were analyzed. Table 3 indicates that assemblers realized higher marketing margins when buying the pearl millet grains from individual producers and selling directly to retailers (marketing channel 3) than selling to wholesalers (marketing channels 1 and 7). Supportive to this was the information reported from wholesalers during the interviews. Wholesalers often failed to receive the products from their assemblers of pearl millet grains. They had low unit marketing margins, but benefitted from their economies of size. Marketing channel 5, where producer organizations were the suppliers of pearl millet, performed the lowest marketing margins. Hence collective action of producers can be advised as it contributes to better market efficiency.

Table 3: Pearl millet grain marketing margins in Niger

Marketing channels	Partner buying from the producers	Purchasing price (F/kg)	Transportation costs (F/kg)	Storage Costs (F/kg)	Total transportation and storage costs (F/kg)	Selling price (F/kg)	Gross revenue* (F/kg)	Marketing margins net of transaction costs (F/kg)
1 and 7	Assembler	146	11.51	0.02	11.53	170	165.92	8.39
2	Wholesaler	151	24.16	0.11	24.27	180	179.82	4.55
3	Assembler	146	24.16	0.11	24.27	189	184.46	14.19
4	Retailer	151	14.21	0.71	14.92	194	175.18	9.26
5	Retailer	156	14.21	0.71	14.92	194	175.18	4.26

*Gross revenue=Selling price*Percentage of volume not lost during the transaction

Source: Baseline market survey in Niger

4.2. The case of sorghum market

The volume of sorghum grains bought by an average assembler was 11.4 tons/year; this quantity was equally provided by rural assemblers and individual producers; assemblers sold on average 10.1 tons/year, mainly to rural and urban wholesalers (Figure 6). The volume traded by an average wholesaler was 26.4 tons/year; wholesalers bought the grains mainly from rural assemblers and sold mainly to their wholesaler pairs and the urban retailers (Figure 7). An average retailer bought 4.7 tons/year, mainly from individual producers, wholesalers and producer groups; retailers sold on average 4.6 tons/year, mainly to their retailer pairs (Figure 8). Similarly to the pearl millet marketing, wholesalers could trade among themselves, and so could retailers; some wholesalers also operated as retailers. As for processors, interview data revealed that sorghum was much less processed than pearl millet. Hence, the most important end-users of sorghum are the consumers of grains.

Figures 6-8 show that the major sorghum supply sources were the individual producers and rural assemblers. Interviews revealed that many producers also operated as rural assemblers. Producer groups supplied marginally assemblers and wholesalers with sorghum grains; however, they were supplying importantly retailers.

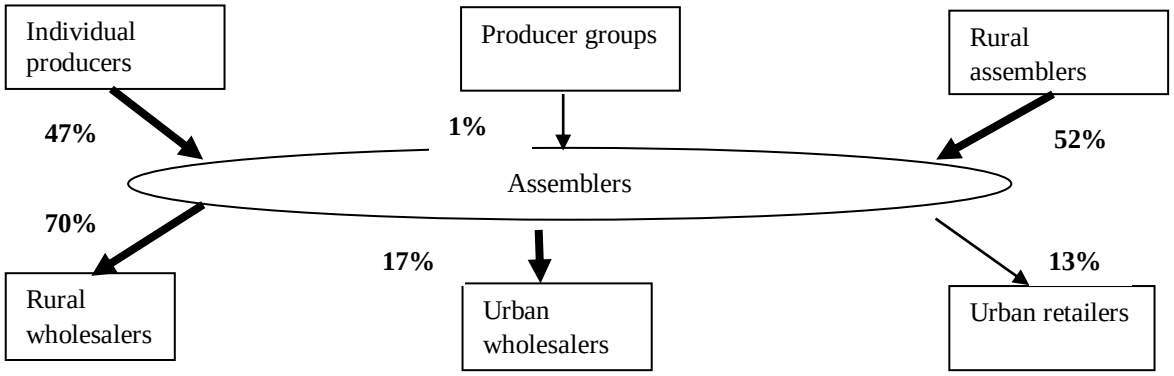

Figure 6: Buying and selling partners of sorghum grain assemblers in Niger

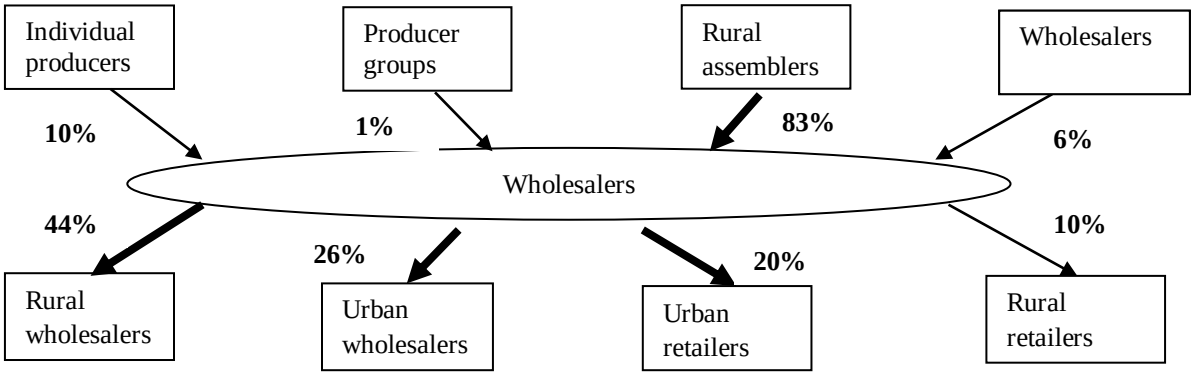

Figure 7: Buying and selling partners of sorghum grain wholesalers in Niger

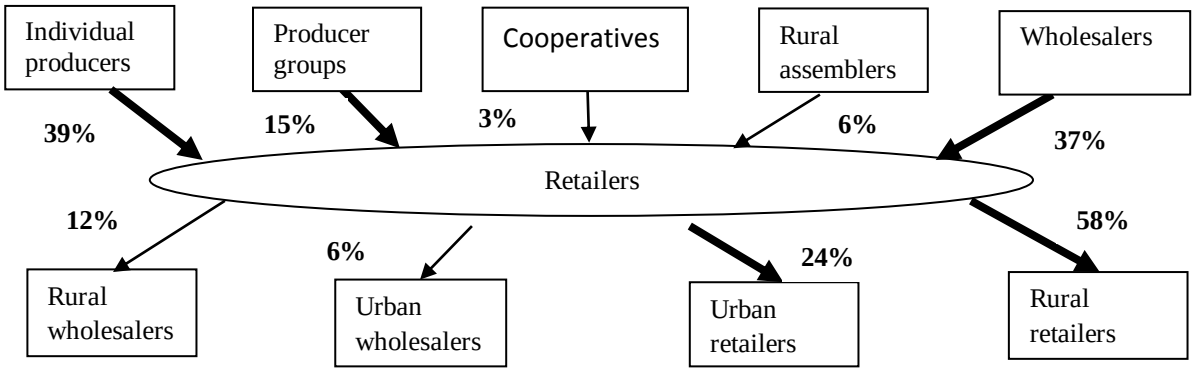

Figure 8: Buying and selling partners of sorghum grain retailers in Niger

Source: Baseline market survey in Niger

The main flows of sorghum grains between the market actors were tracked in Figure 9. Four marketing channels co-existed:

1) Individual producers and rural assemblers-Assemblers-Wholesalers-Retailers-Consumers
2) Individual producers and rural assemblers-Wholesalers-Retailers-Consumers
3) Individual producers and rural assemblers-Retailers-Consumers
4) Producer groups-Retailers-Consumers

According to the interviews, the first two marketing channels were the longest and most commonly used channels. Conversely, the last two marketing channels were the shortest and the less commonly used channels. The same sources of supply applied to pearl millet and sorghum; however, sorghum was much less processed than pearl millet in Niger.

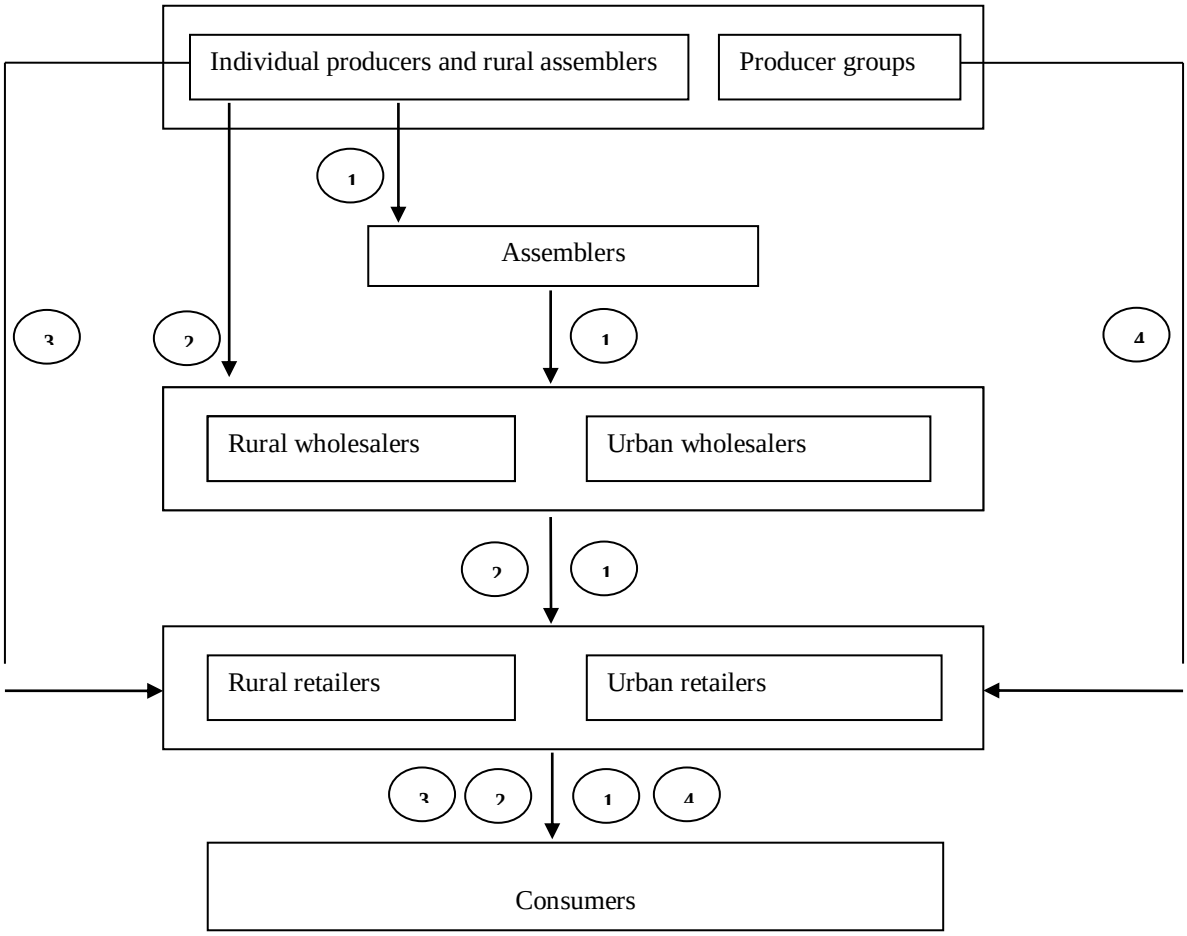

Figure 9: Sorghum grain marketing chain in Niger.

Source: Baseline market survey and interviews in Niger

Table 4 gathers quantities purchased, quantities lost during transportation and from storage, and quantities sold, for assemblers, wholesalers and retailers. It indicates that the market actors mostly traded the local varieties of sorghum grains rather than the improved varieties. Grain losses due to transportation and storage were negligible for wholesalers. Grain losses were more important for assemblers than for retailers.

Table 4: Average quantities of sorghum traded by the market actors

Actor	Volume bought (kg/year)			Volume lost (kg/year)	Volume sold (kg/year)
	Local varieties	Improved varieties	Total		
Assemblers	11,345	32	11,377	1,250	10,127
	99.7%	**0.3%**	**100.0%**	**11.0%**	**89.0%**
Wholesalers	25,793	651	26,444	6	26,438
	80.4%	**19.6%**	**100.0%**	**0.0%**	**100.0%**
Retailers	4,697	18	4,715	126	4,590
	91.7%	**8.3%**	**100.0%**	**2.7%**	**97.3%**

Source: Baseline market survey in Niger

Price distribution along the four marketing channels identified (Figure 10) showed that producer price levels were lower in long marketing channels (138-147 F/kg in the channels 1 and 2) than in short marketing channels (156-160 F/kg in the channels 3 and 4). Remarkably, the highest producer price level corresponded to sales by producer groups to retailers. Selling through the less commonly used marketing channel rewarded 22F/kg more than selling through the most commonly used marketing channel. This suggests producers to sell in groups rather than individually.

As for the perspective of sorghum market performance, Table 5 highlights that assemblers and wholesalers captured important marketing margins net of transportation and storage costs, in the most commonly used marketing channels. Retailers represented the traders profiting the less from sorghum marketing, and buying from producer groups was fairer than buying from individual producers and rural assemblers. This supports collective marketing for producers. It becomes important to devise improvement ways for the commitment of producers to collective sorghum marketing.

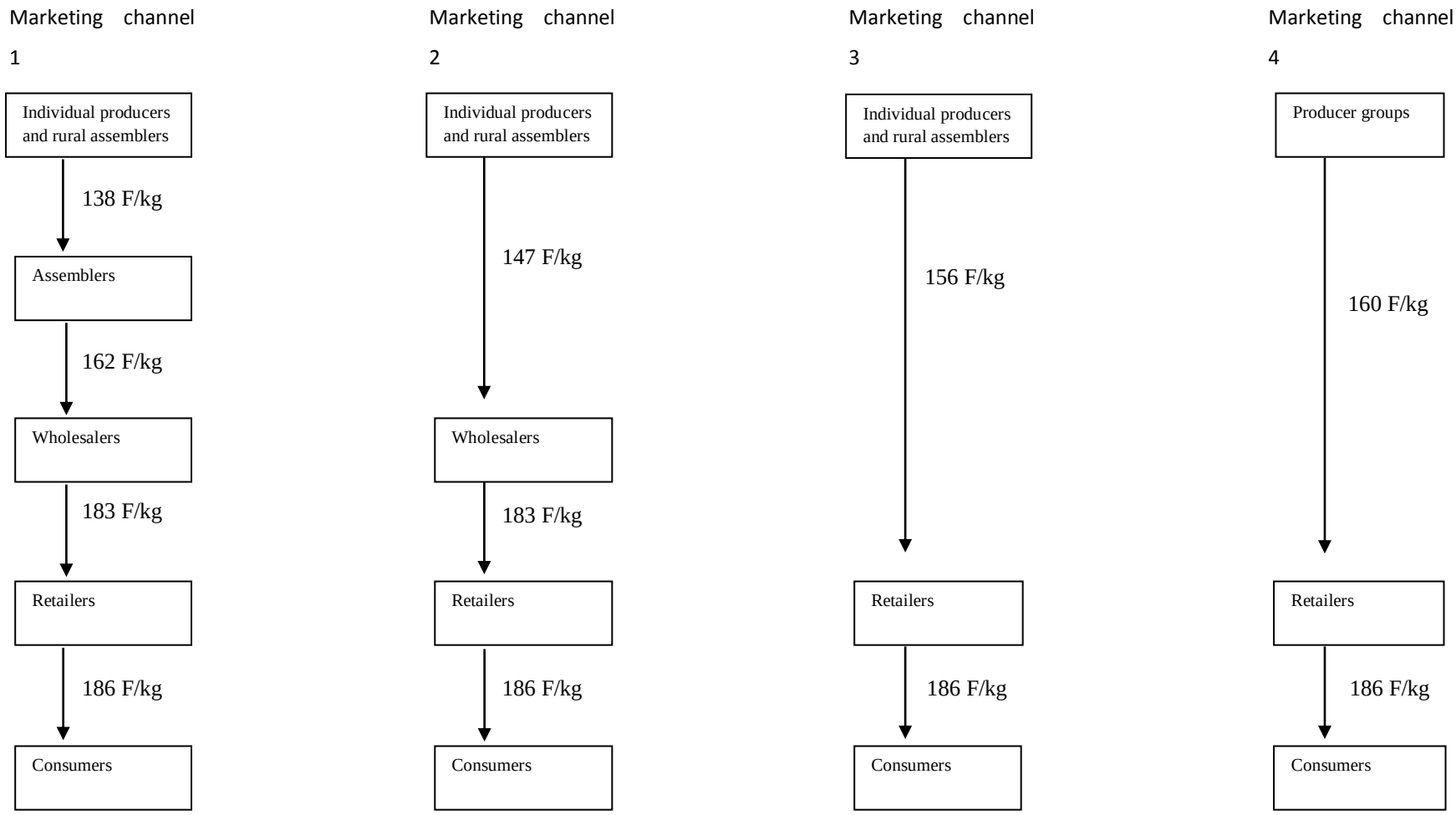

Figure 10. Price transmission along the sorghum grain marketing channels in Niger

Table 5: Sorghum grain marketing margins in Niger

Marketing channels	Partner buying from the producers	Purchasing price (F/kg)	Transportation costs (F/kg)	Storage Costs (F/kg)	Total transportation and storage costs (F/kg)	Selling price (F/kg)	Gross revenue* (F/kg)	Marketing margins net of transaction costs (F/kg)
1	Assembler	138	2.01	0.07	2.08	162	144.18	4.10
2	Wholesaler	147	16.03	0.58	16.61	183	183	19.39
3	Retailer	156	18.57	2.32	20.89	186	180.98	4.09
4	Retailer	160	18.57	2.32	20.89	186	180.98	0.09

*Gross revenue=Selling price*Percentage of volume not lost during the transaction

Source: Baseline market survey in Niger

5. Conclusions and discussions

5.1. Discussions

From the analysis above, two strategies emerge to improve market access for pearl millet and sorghum smallholder farmers in Niger. Collective marketing should be prioritized by producers. As well, linking producers to processors constitutes a priority.

The question of suggesting producer marketing groups as an efficient mechanism for increasing market access and reducing poverty is not a new idea (Poulton et al., 2006). Economic advantages cooperatives may offer farmers include: creation of competitive yardstick, correction of market failure, market power avoidance, provision of missing services, economies of size, profits from another level of the supply chain, guarantee of supplies or markets, risk reduction, and gain from coordination (Schrader, 1989). There is evidence of the marketing performance of collective action among farmers (Kaganzi et al., 2009; Okello and Swinton, 2007). Collective action helps smallholders to reach larger domestic urban, regional and international markets, and may enable them to deal with transportation and storage issues, acquire technologies and certificates to comply with required quality standards, and reach the necessary scale to supply the desired quantity of their products (Markelova et al., 2009). However, institutional arrangements are crucial to make collective marketing effective.

By linking producers to processors through contractual arrangements, producers perceive the advantages of collective marketing and get incentives for doing so while processors also benefit. Agricultural contracts present the advantage to guarantee the flow of products with special requirements, coordinate product delivery, reduce uncertainty about product quality for processors, and to lower income risks for producers (Glover, 1987; Kirsten and Sartorius, 2002; Key and McBride, 2003). Since HOPE Project is interested in increasing market access and incomes, and already works with farmer organizations to produce improved seed varieties, it then becomes promising to pilot a focus on the production of seed varieties required by processors, which can be used to produce grains by the members of the farmer organizations; subsequently, contracts between the farmer organizations and the processors can be arranged and their effectiveness analyzed.

5.2. Concluding remarks

From the analysis of the structure, conduct, and performance of the pearl millet market in Niger, it appears that the marketing channels characterized by grain suppliers being the producer organizations or grain end-users being the processors are efficient. Sorghum is less processed than pearl millet, but the result that producers gain more if they sell through their organizations remains. This suggests the hypothesis that arranging for grain marketing between producer organizations and processors will be efficient. Therefore, the HOPE project can consider this line of development research. Besides, there are some limitations in this study which have to be highlighted. This document does not assess any variation of its main results with different localities/markets and across periods. The experiment suggested to the HOPE project is subject to the respective contractual preferences of farmer organizations and processors. In addition, promoting one marketing channel over the others will create some changes in the marketing chain which have not been discussed. It is worth addressing further those issues.

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