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Full Length Research Paper

A study of marketing economics of tomato in the district of Bamako, Republic of Mali

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This study was initiated with the objective s of evaluating the marketing margin of tomato in the district of Bamako in the period of abundance 2012. The study analyzes the marketing of tomato and identifies the problems and opportunities for enhancing the gross margin. A survey was conducted using structured que stionnaires to collect primary data from 40 whole salers and 40 retailers. The re sults of the estimation of marketing margin functions were obtained using the relative price spread. This study revealed that the majority of respondents were more than 35 years of age; about 95% of them were female. It was also revealed that 50% of wholesalers were illiterate, while 7.5, 32.5 and 5%, had organic, primary and secondary education level, respectively. The results indicated that the farm-gate price (205.13 Fcfa/kg) and marketing cost (114.23 Fcfa/kg) of tomato are among the highly in fluential factors on the entire marketing margin. The wholesale margin function was affected by the wholesale price (408 Fcfa/kg) and wholesale cost, while the retail margin function wa s influenced by the retail price (421 Fcfa/kg) and the retailer cost.

Key words: Marketing margin, tomato, Bamako, tomato marketing, marketing margins, wholesalers, retailers.

INTRODUCTION

Tomato is one of the largest horticultural crops of Mali, with an estimated annual production of 50,000 tons since 2002 and an annual growth rate of 10.2% between 1994 and 2004, one of the highest growth rates in West Africa (Valerie et al., 2005). Malian tomato production has been increasing, but mainly to satisfy growing local urban demand.

West African tomato production represents only 1% of the world production. In Mali, tomato production has been expanding along with that of Côte d'Ivoire (3% annual growth with an average aggregate production of 149,000 tons from 1994-2004), while the production of neighboring Senegal and Burkina Faso has been declining (FAOSTAT, 2005). At pres ent, tomato production is widespread throughout Mali during the contre-saison that immediately follows the rice harvest of October-December and extends to April. Centers of production are peri -urban areas and the irrigated perimeters in the Office du Niger and Baguineda. Production of tomato, grown on irrigated land, is highly variable from year to year. About 750 to 1,000 ha are planted with tomato in several parts of Mali (Koulikoro, Mopti, Segou, Bamako and its environs along the rail route from Kati to Kita, at Baguineda, and in the zone operated by OHVN) (USAID/EGAT, 2002).

Marketing of tomato involves several actors among whom are collectors, wholesalers and retailers. Collectors are operators who ply the area to buy tomato from growers and resell to wholesalers. Wholesalers are those who purchase tomato at bulk prices from collectors. Retailers are those who buy in small quantities either directly at the market from growers or from wholesalers and collectors (Diakité and Kergna, 2002).

Marketing margin or price spread is a commonly us ed measure of the performance of a marketing system (Abbott and Makeham, 1990). It can be a useful descriptive statistics if used to show how the consumers' expenditure is divided among market participants at different levels of the marketing systems. It is defined as

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the difference between the price the consumer pays and the price that is obtained by producers, or as the price of a collection of marketing services, which is the outcome of the demand for and supply of such services. Marketing margin is an equilibrium entity that is a function of the differenc e between the equilibrium of retail and farm prices (Wohlgenant, 2001), or between export and farm prices (Carambas, 2005). However, they give an indication of the performance of a particular industry (Tomek and Robinson, 1990), or an indication of the market structure and efficiency. Marketing m argins are the result of the demand and supply factors, marketing costs, and the degree of the marketing channel competition (Marsh and Gary, 2004). Thus, margins reflect the aggregate processing and retailing firm behavior which influence the level and variability of farm prices and may influence the farmer's share of the consumer food dollar (Gardner, 1975; Wohlgenant and Haidaicher, 1989; Tomek and Robinson, 1990). Sexton et al. (2005) argued that even though variations in the margin over time might be attributable to marginal marketing costs under perfect competition, additional factors such as seasonality, technological changes, and sales volume may also explain the variations in the margin. The explanatory variables used to explain the variations in the margin may include marketing costs, total volume traded, time trend, seasonality, lagged margin, etc. There are trade relationships between traders in production and consumption areas in the central markets of Bamako. Though, each farmer in the production area has an agent in each of the markets (Medine and Dibida), a farmer or a trader c ontacts the market agents to determine the market price and to choose the market with the higher price. There is also communication among the agents in the two central markets, to fetch the highest pric e of tomato in the two markets. Sometimes, the brokers who are in contact with the traders in different markets purchase tomato from low price markets and sell it in the high price market. Thus, the distribution strategy of tomato depends on the market price. The mark et with the higher price is the first receiver of tomato production and the surplus is directed to other markets and this phenomenon is observed in all markets in all seasons. These central markets kept receiving varying quantities of tomato from different sources.

This study is aimed at highlighting the marketing economics of tomato in the district of Bamako from December 2011 to April 2012 in the period of abundance. These markets receive tomatoes from different production areas while the products are distributed through wholesalers and retailers.

MATERIALS AND METHODS

Study area

This study was conducted in Bamako which is the state capital of the Republic of Mali, with a population of 1.8 million (Census, 2009). Situated along the banks of the Niger River, Bamako is both Mali's administrative and economic center. Geographically, Bamako compris ed six communes. Communes I, II, III and IV sit on the northern left bank of the Niger River, while communes V and VI lie to the southern right bank. The *per capita* consumption of vegetables in Mali is 15-34 kg/capita/year (Fabien and Louis, 2005). People in upper income strata consume well above the national calculated average, while the bulk of rural population and large perc entage of poorer strata among the urban population consume very few vegetables.

Data collection

For the purpose of this study, primary and s econdary sources of data were utilized. The primary data were gathered from questionnaires that were distributed among retailers and wholesalers of Bamako district, in 2012. In total, 40 retailers and 40 wholesalers were interviewed.

Analytical approach

To investigate the mark eting margin thoroughly and exactly, it was divided into two smaller portions, the Retailer Margin and Wholesale Margin. The Wholes ale Margin is the difference of the price at which wholesalers sell their product and the price which they pay to the farmers as they buy the product from them, and the Retailer Margin refers to the difference of the price at which the retailers sell the acquired products to the consumer and the price they pay to the wholesalers.

Marketing margin can be affected by various factors, with regards to the virtue of the degree of influenc e each factor has over time, though it can fluctuate. Therefore, it is essential that the factors that bring about changes in the marketing margin function be determined and the degree to which each factor affects marketing margin be measured. Thus, in order to quantify the factor affecting the marketing margin, the Mark-up Model, the Relative Price Model, the Marketing Cost Model and the Rational Expectation Model, which are generally utilized in researches and studies, are used in this research work.

The Mark-up Pricing Model was designed and suggested by Waugh (1964) where he specifies that the consumer-price is the determining factor in concluding the difference between the retail price and farm price. The marketing margin is defined as a function of the retail price and marketing cost:

$$MM = f(RP, Z). \quad (1)$$

Where: MM = marketing margin; RP = retail price; Z = the vector of all the other variables such as marketing costs .

In this model, the marketing margin can be expressed as an absolute value or in percentage.

The Retail Price model was designed and suggested by Wohlgenant and Mullen (1987) where the marketing margin is defined as a function of the retail price, the quantity of the goods and the marketing agent cost:

$$MM = f(RP, TR, Z). \quad (2)$$

Where: MM = mark eting margin; RP = retail price; TR = traded product value; Z = marketing costs.

Another model, which is used in this study, is the Marketing Cost Model. This model is a complement to the Relative Price Model that was also suggested by Wohlgenant and Mull en (1987). In this model, it is assumed that the ground is all readily paved for the competition of economic enterprises rendering marketing services in such a way that the final costs equal the final income. Also in this model, marketing margin is a function of the quantity of the farm product and the marketing cost:

$$MM = (Q, Z). \quad (3)$$

Where: MM = marketing margin; Q = quantity of farm product; Z = marketing costs.

The Mark-up Model, the Relation Price Model, and the Marketing Cost Model are all static models where the marketing margin is a function of the retail price, the marketing cost, and other variables. Using the Rational Expectation Model, Wohlgenant and Mullen (1987) proved that at the end the retail price compared to the wholesale price or farm gate price is demurred or delayed. Accordingly, by using the First Order Condition (FOC) to maximize the net income expected, one can extract the marketing margin equation. This equation is known as the Rational Expectation Model, which is presented as follows:

$$Mt = f[PF_t, E_t(PF_{t+1}), Z_t, r, g]. \quad (4)$$

Where: PF_t = farm price at the defined time; $E_t(PF_{t+1})$ = expected farm price in the future, 'r' to the interest; g = ratio of inventory to sale; Z_t = vector of marketing cost.

This model requires an auxiliary equation to determine $E_t(PF_{t+1})$, that is, the determination of rational expectations.

The rational expectation may also be determined through the ARMA Model by using the retail and farm price:

ARMA (p, q):

$$Y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + \ldots + \alpha_p y_{t-p} + \varepsilon_t + \beta_1 \varepsilon_{t-1} + \ldots + \beta_q \varepsilon_{t-q} \quad (5)$$

The econometric analysis software SPSS and Eviews6 were used for data analysis.

RESULTS AND DISCUSSION

There are two major marketing channels for mark eting in the district of Bamako:

1. Produc er – Wholesaler – Retailer – Consumer.
2. Produc er – Retailer – Consumer.

Socioeconomic characteristics

Table 1 shows the socioeconomic characteristics of the respondents

Age

The respondents' age ranges from 19 to 50 with an average of 29 years. About 17.5% of the traders fall below 24 years. It was observed that 22 wholesalers (55%) and 29 retailers (72.5%) were from 25-35 years old category, 9 wholesalers (22.5%) and 4 retailers (10%) were from 35-45 years old category, and 2 wholesalers (5%) were traders whos e age category were higher than 45 years old.

Gender

In terms of gender, 36 wholesalers (90%) and 40 retailers (100%) were females, and 4 wholes alers (10%) were males. Mainly, marketing of tomato is practiced by women (Diakité and Kergna, 2002).

Education

Education is a c rucial factor for skill development and enhancing effective production and marketing decisions (Bezabih and Hadera, 2007).

In terms of education, the findings showed that 20 wholesalers (50%) and 29 retailers (72. 5%) have never been to school, 13 wholesalers (32.5%) and 8 retailers (20%) passed primary education, 4 wholesalers (10%) and 2 retailers (5%) went to secondary school, while 3 wholesalers (7.5%) and 3 retailers (7.5%) had organic education. Upton (1987) reported that education has an important influence in managerial ability and decision making.

Marketing experience

In terms of experience, 9 wholesalers (22.5%) and 6 retailers (15%) had an experience of between 1 and 3 years, 17 wholesalers (42. 5%) and 12 retailers (30%) practiced for 3 to 5 years, while 14 wholesalers (35%) and 22 retailers (55%) have more than 5 years experience.

Table 2 shows that the price of tomato at farm gate is

Table 1. Socioeconomic characteristics of traders in the district of Bamako.

Characteristic	Wholesaler		Retailer	
	Frequency	percentage	Frequency	percentage
Age (years)				
<24	7	17.5	7	17.5
25-35	22	55	29	72.5
35-45	9	22.5	4	10
>45	2	5	0	0
Total	40	100	40	100
Gender				
Male	4	10	0	0
Female	36	90	40	100
Total	40	100	40	100
Education				
Illiterate	20	50	29	72.5
Organic	3	7.5	3	7.5
Primary	13	32.5	8	20
Secondary	4	10	0	0
Total	40	100	40	100
Marketing experience				
< 1	0	0	0	0
1-3	9	22.5	6	15
3-5	17	42.5	12	30
> 5	14	35	22	55
Total	40	100	40	100

Source: Data collected (2012).

Table 2. Comparison of farm price, mar keting cost, and retail price of tomato in the district of Bamako (Fcfa/kg).

Channel	Farm price	Marketing cost	Sum of farm price and marketing costs	Retail price
1	205.13	114.23	319.36	421
2	205.13	82.44	287.57	385

Source: Data collected and calculated (2012).

less than the retail price. The increase in retail price may be due to the higher marketing costs (transport, storage, packing list, taxes, etc.). This result is in agreement with that of the study of Altoum (2008) who found inadequate marketing services such as transport, packing and handling representing the main obstacles facing marketing activities.

As observed in Table 3, the average price paid to the farmer, through channel 1, by the local buyers, dealers, wholesale agents and other brok ers is 205.13 Fcfa/ kg while they s ell the product to the retailers at 408 Fcfa/kg, and the retailers sell at 421 Fcfa/kg to the customers.

Through the second channel of marketing based on the farmer's financial stability, the farmer carries the product to different cities and retail markets where he can easily sell his product at a much higher price.

The average price at which the farmer sells his product is 205. 13 Fc fa/kg while the retailer can sell the acquired item at 385 Fc fa/kg to the consumers. According to Piya (2001), the price setting depends on demand and supply of vegetables in the market as well as the distance that separates the place of production and the place of sale. Adepetu (2010) also found that generally the price of tomato varies considerably, not only seasonally, but every day and every hour due largely to the

Table 3. The far m price, w holesale price, and retail pr ice of tomato in the district of Bamako (Fcfa/kg).

Channel	Farm price	Wholesale price	Retail price
1	205.13	408	421
2	205.13	365	385

Source: Data collected and calculated (2012).

Table 4. Results of estimating the w holesale marketing margin of tomato in the district of Bamako (Fcfa/kg).

Variable	Coefficient	T-Statistic	Level of significance
Constant value	12.55	-8.84	***
Wholesale price	1.18	3.47	***
Marketing cost	0.201	5.88	***
* Significance at 1%			
R^2 = 0.51			
F- Statistic = 21.55			
DW = 1.71			

Source: Data collected and calculated (2012).

Table 5. Results of estimating the retail mar keting margin of tomato in the district of Bamako (Fcfa/kg).

Variable	Coefficient	T-Statistic	Level of significance
Constant value	17.66	-6.04	***
Retail price	1.62	4.49	***
Marketing cost	0.403	6.01	***
* Significance at 1%			
R^2 = 0.57			
F- Statistic = 24.05			
DW = 1.51			

Source: Data collected and calculated (2012).

uncertainties of demand and supply.

In analyzing factors explaining variations in the margin, some authors used the observed margin as a dependent variable (Brorsen et al., 1985; Wohlgenant and Mullen, 1987; Schroeter and Azzam, 1991) while others used the expected margin (Holt, 1993) as a dependent variable criticizing the former for not taking expectations with respect to both the mean and variance of the output price.

As specified earlier, there are different models for estimating and studying the factors influencing the margin. In the present research, depending on the available data and information, a combination of the mark-up pricing model, the relative price model, and the marketing cost model, was applied.

The wholesale marketing margin function is calculated by applying the Ordinary Least Squares (OLS). Table 4 displays the res ults of the approximation of the above function. It shows that the wholes ale price and marketing cost spent by wholesalers have a significant and positive relationship with the wholesale marketing margin. An increase of 1% in wholesale price and marketing service costs brings about an increase in the marketing margin.

The result from the theoretical point of view is acceptable, as the wholesale marketing margin is derived from subtracting the wholes ale pric e from the farm-gate price. There is a positive relationship between the wholesale price and the marketing margin, and the increase in the wholesale price results in the increase in the wholesale marketing margin.

The F-statistics clearly shows that the above regression is statistically significant and R^2 indicates that the independent variables accounted for an explanation of 51% of the c hanges in the wholesale marketing margin. The DW-statistics equals to 1.71 and is an indication of the fact that the disturbance term of the above model does not show any sign of autocorrelation.

The Retail Marketing Margin function was estimated using also the Ordinary Least Squares (OLS) method. This function is in the logarithmic form (Table 5). The results of the estimated function in Table 5 indicated that

the retail pric e and the marketing cost of retailers have a positive significant relationship with the Retail Marketing Margin.

The result also affirms that an increase of 1% in the retail price and the marketing c ost could initiate an increase of 1.62 and 0.403% in the Retail Marketing Margin. As the marketing margin is obtained by subtracting the retail price from the wholesale price, theoretically the above results can be expected. Cons equently, the retail price has a direct relations hip with the retail mark eting margin where an increase in the retail pric e causes an increase in the marketing margin.

The F-statistic shows that the regression is statistically significant and R^2 confirms that in general the independent variables are responsible for 57% of the changes in the retail marketing margin. The D.W. statistic equals to 1.51 and it is the sign of the fact that there is no sign of autocorrelation in the disturbance term of the model.

Conclusion

The present study obviously revealed that traders do not always make such large profits. The low profit levels could be due to seasonal fluctuations. Closure of tomato concentrate factory in Mali is also a factor that strongly influences the marketing of tomato in the period of abundance. The analysis of the results has also shown that total marketing margin of tomato in the district of Bamako is affected by many factors such as the marketing cost, producer prices and the quality and quantity of the product.

A better monitoring of prices will give more precise information about the performance of the marketing system (transportation, promoting grouped marketing, and market information) and will improve its effectiveness. However, the improvement of systems of conservation and transformation will stagger the periods of high consumption and inc rease market potential.

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