Supermarket expansion in developing countries and their role in development: Experiences from the Southern African Development Community (SADC)

Rosemary A. Emongor[1] and Johann Kirsten[2]

[1] Agricultural Economist, Kenya Agricultural Research Institute
P. O. Box 32-00902 Kikuyu Kenya. E-mail: remongor@yahoo.co.uk.

[2] Professor, Department of Agricultural Economics, Extension and Rural Development 0002 Pretoria, RSA. Email: Johann.Kirsten@up.ac.za.

Contributed Paper prepared for presentation at the International Association of Agricultural Economists Conference, Beijing, China, August 16-22, 2009

Supermarket expansion in developing countries and their role in development: Experiences from the Southern African Development Community (SADC)

Rosemary A. Emongor[1] and Johann Kirsten[2]

Abstract

This paper assesses the impact of the growth in the number of supermarkets in SADC countries. It uses a case-study approach in two countries-Botswana, and Zambia. Data was collected from 16 chain supermarkets and 42 local shops in Botswana and Zambia and 78 small-scale farmers who produce FFV for the market in Zambia in 2005 and 2007. A one-way analysis of variance was used to compare food product prices in supermarkets and local shops and two-step impact model was used to determine the impact of supermarkets procurement on small-scale farmers. The results show that prices of processed food products were cheaper in supermarkets in Botswana and Zambia, implying that consumers gain from purchasing food products from chain supermarkets in case-study countries. Small-scale farmers who access chain supermarkets FFV supply chain in Zambia registered higher income compared to their counterparts who sold on the traditional market. The study concluded that participation in the supermarkets supply chains may impact positively on both consumers and small-scale farmers.

Key words: Supermarkets, impact, SADC

[1] Agricultural Economist, Kenya Agricultural Research Institute
P. O. Box 32-00902 Kikuyu
Kenya. E-mail: remongor@yahoo.co.uk. Corresponding author

[2] Professor, Department of Agricultural Economics, Extension and Rural Development
0002 Pretoria, RSA. Email: Johann.Kirsten@up.ac.za.

1.0 Introduction

As elsewhere in the world supermarkets are expanding rapidly in Africa. The growth and expansion of supermarkets in Africa are spearheaded by South African supermarkets that have been expanding enthusiastically into other African countries since 1994 when apartheid was abolished (Games, 2003). This growth has been fuelled by increased globalization, increased urbanisation, trade liberalization, increased economic growth, positive political changes, regional integration arrangements, increased per capita income and middle class population groups and liberalization of foreign direct investment (University of Capetown, 2000). Now, major South African chain supermarkets own one or several outlets in a number of SADC countries (Table 1). As much as the FDI by South African firms bring the much-needed capital for development , the impact of South African supermarkets in SADC and the rest of Africa is least understood (DBSA, 2003).

Table 1: Number of outlets of South African supermarkets in SADC (2007)

Country	Shoprite	Pick 'n Pay	Spar (multinational)	Woolworths (RSA)	Total number of stores	% of stores
South Africa	718	552	675	320	2265	85.4
Angola	8	0	0	0	8	0.3
Botswana	10	19	26	11	66	2.5
Lesotho	7	0	0	2	9	0.3
Mauritius	1	0	11	1	13	0.5
Malawi	5	0	0	0	5	0.2
Mozambique	5	0	0	0	5	0.2
Namibia	65	15	19	4	103	3.9
Swaziland	7	6	7	3	23	0.9
Tanzania	5	0	0	1	6	0.2
Zambia	18	0	2	1	21	0.8
Zimbabwe	1	56	70	2	129	4.9
Total	850	648	810	345	2653	100

Source: Adapted from various supermarkets' annual reports (2007).

There is a growing body of literature on supermarket growth in developing countries, but there are very few empirical studies in Southern Africa that have gone beyond the initial

work of Weatherspoon and Reardon (2003) in effectively documenting the extent and size of the investment mainly of South African supermarket chains in the rest of Southern Africa and the impact this has had on the agricultural and food sectors of the host nations.

This paper attempts to assess the impact of South African supermarkets expanding into the SADC. It uses a case-study approach in two countries – Botswana and Zambia. Anecdotal evidence provided by Mattoo and Payton (2007) suggests, for example, that the cash income of Zambian farmers has increased since Shoprite started sourcing from them, and at the same time, access to local health care and educational services have also improved. The objective of this paper is to provide some quantification and some measurable results of these reported impacts.

The paper is organized as follows: Section two discusses the impact of supermarkets on consumers by comparing prices of food products in chain supermarkets and local shops. Section 3 discusses the methods of measuring and impact of small-scale farmers' participation in the supermarket FFV supply chain on farm income. Section 4 gives the conclusions of the study.

2. Impact of supermarkets procurement on consumers

In order to determine the impact of supermarkets on prices, comparison of prices of similar products in chain supermarkets (16) and local shops (42) was carried out. Data on FFV and processed food prices were collected from chain supermarkets, traditional retailers (local shops such as small independent supermarkets, general dealers, Spaza

shops, kiosks, street vendors and local whole market of FFV) in the case-study countries. The average retail prices per kilogram or litre across supermarkets and local shops were documented. Prices in Zambia and Botswana were collected in April 2007. A one-way analysis of variance was performed to test for equality of means between prices in supermarkets and local shops. This test is fully described in Snedecor and Cochran (1989: 89-94).

Table 2: Comparisons of mean retail prices in chain supermarkets and local shops

	Botswana (Pula; 1 US$ =5.54Pula)				***Zambia (Kwacha, 1US$=4800Kwacha)***			
Product	***Super market N=12***	***Local shops N=22***	***LSD***	***P value***	***Supermarket N=4***	***Local shops N=20***	***LSD***	***P value***
Wheat flour	3.32	6.00	0.92	0.013**	5070	5550	36.75	0.0001***
Maize flour	2.75	4.24	0.60	0.001***	1635	2000	254.1	0.0196**
Bread	2.96	4.48	0.31	0.0001***	2200	3600	343.7	0.001**
UHT milk	6.68	10.49	1.15	0.0003***	5200	5425	271.8	0.078
Fresh milk	6.41	7.92	1.5	0.05*	3502	3927.5	169.7	0.0041***
Sugar	4.67	6.16	1.41	0.0247**	3737.5	4025	209.2	0.0221**
Tomato sauce	10.43	14.45	2.39	0.0117**	-	-	-	-
Dry beans	14.01	14.02	3.17	0.91	-	-	-	-
Rice	6.06	10.05	1.64	0.0006***	6135	6650	270.5	0.009***
Apples	6.07	12.93	1.19	0.0001***	15250	10063	706.8	0.0002***
Oranges	3.36	7.93	2.15	0.0081***	9875	7000	457.0	0.0003***
Bananas	6.41	10.05	1.43	0.0034**	-	-	-	-
Cabbage/ head	6.47	9.60	1.20	0.0033**	3000	1500	259.9	0.0004***
Irish potatoes	4.52	8.28	1.54	0.0024**	2725	1300	102.7	0.0001***
Onions	6.76	9.95	3.56	0.0995	4000	2000	389.8	0.0005***
Tomatoes	7.36	11.86	1.46	0.0005***	3000	1987.5	135.9	0.0002***
Carrots	5.86	11.20	2.43	0.0042**	7870	6500	161.2	0.0001***

Source: Survey results, 2007

* 10 % significance level, ** 5% significance level; *** 1% significance level

Note: Comparison between stores within a country is done here. For that reason a common currency was not included.

In Botswana and Zambia on average supermarkets offered significantly lower prices compared to local shops especially in the processed food categories (Table 2). This could

be attributed probably to the use of efficient supply chains and scale economies in sourcing and procurement. In the fresh-foods category street vendors and traditional wholesale markets (Soweto market in Lusaka and Saturday market in Chipata) offered significantly lower prices compared to supermarkets in Zambia, whereas in Botswana supermarkets had lower prices in both processed and FFV products (Table 2). These results concur with those of Cooper, 2002; D'Hease & Van Huylenbroeck, 2005 who showed that consumers do gain from supermarket trade.

3. Impact of supermarkets procurement on small-scale farmers

A two-step treatment effects model was used to determine the factors that influence small-scale farmers' decisions to supply to the supermarket channel and the impact of participation on farmer income (Heckman, 1979).

3.1 Two-step impact estimation model

The model, accounting for farmers' participation or non-participation in supermarket FFV supply chains is given as:

$$Y_i = \beta X_i + \delta R_i + \varepsilon_i \quad (1)$$

δ is the treatment effect (impact) to be estimated; R_i is a dummy variable, indicating whether the farmer participates in the supermarket channel or not. The sample selection rule is that Y_i is observed when $R^*_i > 0$

The model for supermarket participation (whether the farmer chooses to sell to a supermarket channel or not) is given as:

$R^*_i = w_i z_i + u_i$ defines households that participate in the supermarket channel as (2)

$R_i = 1$ if $R_i^* > 0$, 0 otherwise

$R_i = 0$ if $R_i^* \leq 0$

Y_i is observed when $R_i^* > 0$

u_i and ε_i are distributed such that u_i / ε_i is jointly distributed

$(u_i \mid X_i) \sim N(0, \sigma^2, \rho)$

Given that $u_i \sim N(0, \sigma^2=1)$

$\Pr(Y_i \text{ observed} \mid X_i, Z_i) = 1 - F(-w_i Z_i)$

$E(Y_i \mid Y_i \text{ observed}, X_i, Z_i) = \beta X_i + \sigma\lambda_i$

Where $\lambda_i = E(u_i \mid u_i > -w_i Z_i) = f(-w_i Z_i) / 1-F(-w_i Z_i)$ – indicator or inverse Mills ratio, λ_i can be estimated from the probit model coefficients, obtained by the maximum likelihood estimation method. The equation for estimating the impact of supermarkets on small-scale farmers can be written as the following:

$$Y_i = \beta X_i + \delta R_i + \sigma\lambda_i + v_i^*$$

Where $E(v_i^* \mid X_i) = 0$

To obtain the average treatment effect, δ was estimated by regressing Y_i on X_i, R_i and estimated λ_i by ordinary least squares method. This model was intended to answer the research question *Do small-scale farmers gain by participating in the chain supermarkets FFV supply chain?*

3.2 Estimating the model

In this section, the variables that were included in the two-step treatment model for estimating the supermarkets' impact on small-scale farmers are discussed.

The number of small-scale farmers involved in supplying FFV to the market was small in Botswana. Therefore, the analysis was done solely for Zambia, where a reasonable data set was available. To estimate equations 1 and 2, data was collected from 78 farmers (20 small-scale farmers who supply FFV to Shoprite in Lusaka, and 58 who supply to traditional markets in Zambia) for the year 2005. The dependent variable consisted of two variables: (1) the probability that a farmer participates in the supermarket supply chain for FFV by selling FFV to Freshmark or directly to Shoprite, and (2) the value of sales of vegetables (proxy for income) to the supermarket. The first variable assumes a value of 1 for those who participate in the supermarket supply chain and a value of 0 for those who do not (Table 3). The products used in the analysis included all the fresh vegetables grown by any farmer in the area that could be sold directly to a supermarket or designated buying company.

Independent variables

The independent (explanatory) variables used in the empirical model are discussed here below.

The variable *land* (FARMSIZE) was documented in hectares (ha). Households accessed land through ownership or rental. Households with more arable land have greater potential to produce more FFV and stand a better chance of participating in the FFV market. Ownership of land alone, without other inputs, may not necessarily increase the probability of a farmer accessing the supermarket supply chain for FFV.

Table 3: Dependent and independent variables used in the model

Dependent variables	**Model description**
Fresh fruit and vegetable market	• Probability of selling FFV (STSMKT) • Value of products sold (VFFVSALT)
Independent variables	
Household resource endowments (assets)	• Farm size (ha) • Ownership of tractor or vehicle (yes=1, 0 otherwise)
Household structure	• Labour = number of household members working on the farm + hired labour (numbers) • Age of household head (years) • Gender of household head (household head is female = 1, 0 otherwise)
Information-accessing variables	• Distance from farm to market or urban centre (km) • Membership in a farmers' organisation (yes = 1, 0 otherwise)

Ownership of a tractor or vehicle (OWNVEH) could help reduce transaction costs, especially transport costs, enabling the household to participate in the FFV market more easily. Ownership of tractor or vehicle may help farmers to seek and access distant markets, thus increases their likelihood of being able to supply the supermarket channel. This was also a dummy variable, assuming the value of 1 if the household owned a vehicle or tractor and 0 if not.

The *total number of people working on the farm* (LABOUR), which includes the number of household members who work full-time on the farm plus hired workers, may influence the ability of the household to produce for the market. Households with a higher labour supply may be able to devote more labour to the production of FFV, which is a labour-intensive enterprise. These households may be able to produce more, making participation in the FFV chain easier. This variable is expected to have a positive impact on participation and income.

The *gender of the household head* (GHHD). Generally, male household heads tend to have more resources and greater access to information for production, compared to female household heads. This variable is presented as a dummy variable assuming the value of 1 if the head of the household is female and 0 if male. Its impact on accessing the supermarket supply chain is unknown.

The *age of the household head* (HHAGE). This variable is taken as a proxy for the farmer's experience in the production of FFV. It is measured in number of years. Older household heads may have more experience in the production of FFV and may have more social capital and wider networks. On the other hand, older household heads may be more averse to taking risks, so that they do not easily adopt new methods of production. Due to the stringent requirements of supermarkets, older household heads may feel that the potential rejection of low-quality produce poses too much of a risk. Many of them may therefore opt not to supply to this market. It follows that younger household heads may be more likely to adopt risky production systems. Therefore, this variable is expected to have either a positive or a negative impact on participation and on income.

The variable *distance of the farm from the nearest urban centre* (DIURBC) was measured in kilometres. Households nearer urban centres are nearer the markets and sources of information about market conditions. These households are more likely to participate in FFV markets as these farmers face lower transaction costs, especially those

relating to transport. This variable is expected to have a negative impact on participation as well as on income.

The variable *membership in a farmers' group* (MOFAGRP) may improve the probability of farmers accessing the FFV markets by increasing the capability of farmers producing a continuous supply of FFV throughout the year. This was a dummy variable assuming the value of 1 if a farmer belonged to a farmers' group and 0 if not. The impact of this variable, in so far as it influences participation in the supermarket channel and impacts on household income, is unknown in the context of SADC countries.

3.3 Factors that influence a farmer's decision to supply FFV to supermarkets vs. traditional markets

The model for farmers' decisions to supply to supermarkets is determined by the probit model, which is specified as:

Pr (STSMKT) = f (FARMSIZE OWNVEH HHAGE GENHD LABOUR DIURBC MOFAGRP)

The probability of selling to the supermarket channel is influenced by the explanatory variables specified in the model. Table 4 presents the results of the probit estimates of factors influencing farmers' participation in the supermarket FFV supply chain.

As shown in Table 4, the model is highly significant and correctly predicts 90% of the observed outcomes. The model chi-square of 61.22 is highly significant at a 1% significance level. This implies that perhaps the model identifies all factors influencing farmers' participation in the supermarkets' FFV supply chain. Four of the seven factors

are significantly different from 0. Two of these (ownership of a tractor or vehicle and labour) are positively related to participation in the supermarkets' FFV supply chain, whereas two (distance of farm from urban centre and membership of a farmers' organisation) are negatively associated with farmers' participation in the FFV markets. This implies that a unit increase in distance from the urban centre will reduce the probability of the farmer participating in the FFV market, meaning the closer one is, the better. The remaining three variables (farm size, gender, and age of the household head) do not differ significantly from zero.

Table 4: Factors that influence farmers' participation in the supermarkets' FFV supply chain, probit results

Variable	Coefficient	Std. error	Z-Stat.	P value
Constant	5.343919	3.751057	1.42	0.154
Household endowments				
Farm size (ha)	0.160136	0.150677	1.06	0.288
Owns tractor or vehicle	4.328424	1.810059	2.39	0.017**
Household structure				
Household head age	-0.069235	0.527433	-1.31	0.189
Household head is female	-1.637593	1.058993	-1.55	0.122
Labour	0.490036	0.227575	2.15	0.031**
Information access				
Distance from farm to nearest urban centre	-0.269457	-0.137126	-1.97	0.049**
Membership of a farmers' organisation	-2.429095	1.237532	-1.96	0.050**
% Correctly predicted LR (model) $\chi 2$ N= 74	90 61.22***			
N selling to supermarket = 19				

* 10 % significance level; ** 5% significance level; *** 1% significance level

Membership by farmers of a farmers' organisation is negatively related to participation in the FFV supply chain. This result is contrary to expectation but was also obtained by Hernandez, et al., (2007) in Guatemala, who found that the effect of (lagged) small-scale farmer participation in an association was significant but negative. Farmer organisations in Zambia are cooperatives or informal farmers' groups. The cooperatives were still young, in that they were still being formed. Even though farmers belonged to a cooperative, they sold products as individuals. Cooperatives assist farmers to access inputs and information but not to market their produce. This implies that, given the current level of farmer group formation in the case-study countries, membership of a farmers' group does not increase the probability of the farmer supplying the supermarket or traditional channel. This confirms that supermarkets, in a manner, prefer dealing with farmers on a one-to-one basis. It appears they do not like the countervailing power inherent in a cooperative structure.

3.4 The impact of farmers' participation in the supermarket FFV supply chain on their household income

In stage two of the Heckman procedure, an ordinary least-squares regression was estimated to account for selection bias and to estimate the treatment effect (impact) of farmer participation in the supermarkets' FFV supply chains on farmers' incomes. The OLS model was specified as the following:

VFFVSAL = f (FARMSIZE OWNVEH HHAGE GENHD LABOUR DIURBC MOFAGRP STSMKT Mills)

This means that the value of sales of FFV to supermarkets is determined by the above factors in the model. In order to estimate treatment effects (impact), the OLS model includes the dummy for supermarket participation and the variable inverse Mills ratio (Mills). Table 5 presents the results of the regression model, showing the impact of farmers' participation in the supermarket FFV supply chain on farmers' household incomes.

Table 5: Impact of farmers' participation in supermarket FFV supply chains regression results

Variable	Coefficient	Std. error	t-Stat.	p value
Constant	0.767818	1.214656	0.63	0.530
Household endowments				
Farm size (ha)	0.0108219	0.0581635	0.19	0.853
Owns tractor or vehicle	1.226134	0.62706	1.96	0.055
Household structure				
Household head age	-0.0278303	0.126074	-2.21	0.031**
Household head is female	0.0236544	0.2885752	0.08	0.935
Labour	0.1451915	0.540874	2.68	0.009***
Information access				
Distance from farm to nearest urban centre	-0.0571444	0.025957	-2.20	0.031**
Membership of a farmers' organisation	-483265.6	402691.2	-1.20	0.235
Mills	3.391477	1.848337	1.83	0.071*
STSMKT	1.060624	0.474308.7	2.24	0.029* *
F (9, 64) 4.12 Probability value	4.12 *** 0.0003			
R^2 Adjusted R^2 N selling to supermarket Total N	0.367 0.278 19 74			

** 10 % significance level ** 5% significance level; *** 1% significance level*

The model is highly significant at a 1% significance level, with an F-statistic of 4.12. Five variables have coefficients significantly different from 0. These are household age, labour, distance of farm from urban centre, the supermarket participation dummy variable and the 'Mills'. Participation in the supermarket channel has a positive impact on the farmers' incomes. By participating in the supermarket FFV supply chain, farmers increase their value of sales by 1.06 million kwacha (approximately R 1 494) per month.

Among the household structure variables, a unit change in household age has a negative impact on the value of sales of FFV. Increasing household age by a unit results in the value of sales of FFV declining by 0.03 million kwacha (R39.2) per month. On the other hand, if a farmer increases labour by one person, it will increase the value of sales by 0.15 million kwacha (R 204) per month.

Among the access-to-information variables, distance of the farm from an urban centre has a negative impact on the value of sales. If the distance is increased by 1 unit, it results in a decline in the value of sales by 0.06 million kwacha (R80) per month. Farm size and ownership of a tractor or vehicle do not contribute significantly to the value of sales. The inverse Mills ratio is significant at a 10% significance level in this model. Membership of a farmers' organisation has no impact on household income.

In order to test the null hypothesis that there was no difference in income among farmers who supplied supermarkets and those who supplied the traditional markets, mean quality tests were carried out on the value of sales (proxy for income) for these two groups of

farmers in Botswana and Zambia. The model allows for a comparison in the value of sales for farmers who supplied to supermarkets and those who did not. The results of these mean income comparisons are shown in Table 6.

Table 6: Mean comparison of income of farmers supplying to supermarkets and those supplying to traditional markets in Zambia

Variable	Least-squares means	t Value	P Value
Value of sales (Million Kwacha)			
Supply to supermarkets	K million 2.0701	2.44	0.0252**
Supply to traditional markets	K million 1.1642		

Supply to supermarkets, N=19; Supply to traditional markets, N=55
* 10 % significance level ** 5% significance level; *** 1% significance level

Farmers who supplied to supermarkets had a significantly higher mean value of sales (income), compared to those who supplied to traditional markets in Botswana and Zambia (Table 6). The difference in mean income of those supplying to supermarkets and those supplying to traditional markets was not significant in Botswana. These results imply that supermarkets may be beneficial to small-scale farmers if they can access them. The results from the model are corroborated by those from focus group discussions, in which farmers who supplied to supermarkets reported having increased their income.

Caveat

While questions to capture data on lagged assets were included in the questionnaire the information collected was not sufficient to allow tests of causality. The analysis was carried out using current values of assets; it was not possible to conclude whether

supermarkets select asset-endowed small-holder farmers or whether small-holder farmers accrued assets as a result of trading with supermarkets.

4.0 Conclusion

This paper presents some interesting thoughts on the impact of supermarkets in development. The authors conclude that the expansion of chain supermarkets in SADC may be beneficial to consumers who may access high quality low priced food products especially in the processed food categories. Small-scale farmers who have managed to negotiate contracts with supermarkets are able to supply FFV to these supermarkets. Participation in the supermarkets FFV supply chain may be impacting positively on these farmers. It follows that from these results ways should be found to link more small-scale farmers to supermarkets and other emerging markets in SADC countries.

Acknowledgements

We thank all stakeholders (supermarket managers, traders on traditional wholesale/retail markets and farmers) for participating in the study. We thank the African Economic Research Consortium and the University of Pretoria for financial support.

5.0 References

Cooper, D. 2002. Findings from the Competition Commission's inquiry into supermarkets. *Journal of Agricultural Economics* Volume, 54 (1): 127-143.

DBSA, 2003. *Financing Africa's Development*: *Enhancing the role of private financing*, Development Report 2003. South Africa: Development Bank of Southern Africa, Halfway House: 108-118.

D'Hease, M. & Van Huylenbroeck, G. 2005. The rise of supermarkets and changing expenditure patterns of poor rural households: A case study in the Transkei area, South Africa. *Food Policy*, 30: 97-113.

Games, D. 2003. The experience of South African firms doing business in Africa. A preliminary survey and analysis. *The South African Institute of International affairs*. SAIIA Report No. 37.

Heckman, J. J. 1979. Sample selection bias as a specification error. *Econometrica* 47: 153-161.

Hernandez, R., Reardon, T. & Berdegué, J. 2007. Supermarkets, wholesalers, and tomato growers in Guatemala. *Agricultural Economics*, 36(3):1-29.

Mattoo, A. & Payton, L. (Eds). (2007). *Services, trade and development: the experience of Zambia.* Palgrave-Macmillan and the World Bank.

Reardon, T. & Berdegué, J. 2002. The rapid rise of supermarkets in Latin America: Challenges and opportunities for development. *Development Policy Review*, 20(4): 371- 388.

Snedecor, G.W. & Cochran, W. G. 1989. *Statistical methods*. Eighth edition. Iowa State University Press/Ames

University of Cape Town, 2000. *What are the major trends and determinants of foreign direct investment in SADC countries?* Development Policy Research Unit. DPRU Policy Brief No. 00/P2, July 2000. Industrial Strategy Project (Regional integration, Economic cooperation in Southern Africa). University of Cape Town. South Africa.

Weatherspoon, D. D. & Reardon, T. 2003. The rise of supermarkets in Africa: Implications for agrifood systems and the rural Poor. *Development Policy Review*, 21(3): 333-355.