Sustainable Agriculture Research; Vol. 2, No. 1; 2013
ISSN 1927-050X E-ISSN 1927-0518
Published by Canadian Center of Science and Education

Factors Affecting the Choice of Marketing Channel by Vegetable Farmers in Swaziland

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Received: August 13, 2012 Accepted: October 13, 2012 Online Published: November 6, 2012

doi:10.5539/sar.v2n1p112 URL: http://dx.doi.org/10.5539/sar.v2n1p112

Abstract

Vegetables as a group of horticultural crops are important for their contribution as an income support to a large proportion of the rural households. However, enhancing vegetable farmers to reach markets and actively engage in the markets is a key challenge influencing vegetable production in Swaziland. The perishable nature of vegetables necessitates effective marketing channels. The aim of this paper was to investigate factors affecting farmers' choice of marketing channels using survey data gathered during the 2011 production season. Data were collected from 100 randomly selected vegetable farmers. Descriptive and multinomial logistic regression analyses were used. The results indicated that age of the farmer, quantity of baby corn produced and level of education were significant predictors of the choice to sell vegetables to NAMBoard market channel instead of selling to other-wholesale market channel. The age of the farmer, distance from production area to market, membership in farmer organization and marketing agreement were significant determinants of the choice to use non-wholesale market channel over other-wholesale market channel. It is therefore important to promote collective action as an institutional vehicle for linking farmers to agribusiness supply chains. Farmers should establish networks since they aid in sharing knowledge, farmers can improve produce grades as required by market.

Keywords: vegetable marketing channel choice, multinomial logistic regression model, vegetable farmers

1. Introduction

Vegetable production provides a source of income for the small holder farmer as well as an important source of food security for the people of Swaziland, thereby reinforcing the overall development of poverty reduction goals (Heinemann, 2002). Enhancing the ability of vegetable farmers to reach markets and actively engage in the markets is a key challenge affecting vegetable production in Swaziland. The act of parliament Number 13 of 1985 established the National Agricultural Marketing Board (NAMBoard). This Board was established to promote marketing of important agricultural products including horticultural products (Sithole and Grenoble, 2010). However, the impact of this market structure has been limited since vegetable farmers complain of being offered low prices for their produce (NAMBoard, 2011). This reduces their incentive to participate in economic transactions and result in subsistence rather than market-oriented production systems as a result farmers selling their produce directly to final consumers and private traders at rural or urban markets, as opposed to abiding by their contracts with NAMBoard (NAMBoard, 2011).

1.1 Vegetable Production and Marketing Challenges

Marketing plays a critical role in meeting the overall goals of food security, poverty alleviation and sustainable agriculture, particularly among smallholder farmers in developing countries like Swaziland (Altshul, 1998; Lyster, 1990). Although marketing is important, smallholder farmers still find it difficult to participate in markets, especially when faced with pressures from market liberalization. Generally, very few smallholder farmers participate in formal markets. Makhura (2001) investigated the transaction costs barriers in market participation of smallholder farmers in the Northern Province. Makhura found that marketing by smallholder farmers was constrained by poor infrastructure, distance from the market, lack of assets (for example lack of own vehicles) and inadequate market information. Lack of bargaining power along with various credit bound relationships with

the buyers has led to farmers being exploited during the transaction where most of the farmers become price takers. The majority of the farmers are smallholders and hence, unable to obtain a fair price for their produce. This results to farmers not being able to sustain their livelihood. The structure of the traditional vegetable supply chains is such that there are a large number of intermediaries (e.g. vegetable collectors, transporting agents, commission agents etc.) between the producer and the consumer. Addition of the marketing margins of all these intermediaries coupled with almost 30 to 40 percent of the vegetables being wasted as post harvest losses have eventually resulted in producers receiving a very low price for their produce while at the other end the consumers are compelled to pay a highly inflated price for their purchases (Hettige & Senanayake, 1992; Kodithuwakku, 2000).

Jaleta (2007) showed that inadequate market channels and poor information regarding price were among factors affecting commercialisation of agriculture. Furthermore, Emana and Gebremedhin (2007) in their study on market chain analysis argued that the marketing of horticultural crops is affected by inadequate local markets, poor pricing system, lack of local markets to absorb supply, low produce prices, excess of intermediaries, and poor marketing institutions and coordination of farmers. Emana and Gebremedhin (2007) further argued that poor handling and packaging of products, poor pricing systems, and information asymmetry affect marketing of vegetables.

Markets tend to be disorganized when the farmers and traders who do not fully rely on their vegetable business for a steady income often sell their produce at almost any price offered. Retail agents often encourage this since it provides an opportunity for them to make more profits. In the long run, this is not good for the industry since it promotes an erratic supply and unrealistic pricing structure. Marketing information is important in assisting growers at crop planning stage before planting and to sell surplus produce. In the absence of such marketing information the retail end of the industry does not respond to supply and demand and pricing is set artificially, and it remains static.

1.2 Objective of the Study

The main purpose of the study was to investigate the choice of vegetable market channel by smallholder farmers. Specifically the study sought to identify factors influencing the choice of market channel for vegetable farmers.

2. Methodology

2.1 Research Design

A descriptive cross-sectional research design was employed in the study with an aim of identifying factors influencing the choice of market channel by vegetable farmers.

2.2 Sampling Procedure

The target population was all farmers engaged in vegetable production in Swaziland. An up-to date list of 433 vegetable farmers was obtained from the Ministry of Agriculture and NAMBoard's extension officers. Thus, frame and selection errors were controlled. The vegetable crops studied included cabbage, carrot, onion, tomato and baby vegetables, such as baby corn and baby marrow. These crops accounted for the major proportion of vegetables produced in the country and they were in constant supply in the market (Lwazi Mhlongo. Personal communication, 22 September, 2011). The sampling units were conventional and baby vegetable producers in Swaziland. A two stage sampling technique involving purposive and stratified random sampling was used to draw a sample of 100 farmers.

2.3 Data Collection

Data were collected through the use of face to face personal interviews with the aid of a structured questionnaire. The questionnaire consisted both open and closed-ended questions. The questionnaire was reviewed by experts in the Department of Agricultural Economics and Management to establish content and face validity. Questionnaires were further pretested using farmers who were not part of the sample. Responses from the farmers were used to prepare the final questionnaire.

2.4 Data Analysis

Data were analysed using Statistical Package for Social Sciences (SPSS-PC Version 17.0) software. Descriptive statistics such as means, percentages, standard deviation and frequencies were used to describe the data. A multinomial logistic regression model was employed to analyse factors affecting the choice of market channel by vegetable farmers.

3. Analytical Framework and Empirical Models

3.1 Determinants of Marketing Channel Choice

Decisions to participate in either formal or informal markets or even not participating signify the individual direction to maximizes utility. Multinomial regression was used to analyse the farmers' decisions to participate in NAMBoard market , non-wholesale market or participate in other wholesale market channels and the factors that influenced these choices.

A typical logistic regression model which was used is of the form:

$$\text{Logit}(P_i) = \ln(P_i / 1 - P_i) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + e$$

Where:

$\ln(P_i / 1 - P_i)$ = logit for market channel choice

P_i = not participating in markets

$1 - P_i$ = participating in markets

X_i = independent variables

β_i = parameters to be estimated

e = error term

In the model, choice of market channel represented the dependent variable where participating in other-wholesale market channel had been set as the reference category. The choice of market channel described the decision to sell the vegetables to NAMBoard market channel, other-wholesale market channel or non-wholesale market channel. It followed that P_i represented the probability of participating in NAMBoard market channel and $(1-P_i)$ represented either participating in non-wholesale market channel or other-wholesale market channel. In other words, the model was used to assess the odds of selling vegetables to NAMBoard market channel against selling vegetables to other-wholesale market channel, and selling vegetables to non-wholesale market channel against selling vegetables to other-wholesale market channel.

Table 1 provides the explanation of the independent variables and their *a priori* expectations**.** Age of the farmer represented the age of the vegetable farmer in years. Younger farmers were expected to be more adventurous and less risk averse than older farmers (Knowler & Bradshaw, 2006). Thus age was expected to be negatively associated with choice of market channel. The sex of the farmer was set as a dummy variable, where male took the value one or zero otherwise. Male farmers tend to have better access to productive resources necessary to meet quality requirements of the sustainable vegetable marketing channel than female farmers. Education level of farmer was also assigned dummy values. It took the value one if the farmer was literate or zero otherwise. Education enhances managerial and successful implementation of improved production and marketing practices thereby making it possible for farmers to meet quality standards of the sustainable vegetable marketing channel. The higher the level of education the higher would be the propensity to participate in a market channel. Access to market information was measured by the farmer's ability to access market information and the ability to comprehend such. Farmers were asked about their communication networks that were accessible to them. Access to market information had been set as a dummy variable, where a farmer with access to market information took the value one or zero otherwise. Access to market information was expected to influence market channel decisions positively.

Table 1. Description of the independent variables used in the logistic regression model

Variables	Coding system	Category	Expected sign
X_1 = Age	Number of years	Continuous	-
X_2 = gender	1 if male, 0 if female	Dummy	+/-
X_3 = Education	1 if literate, 0 if illiterate	Dummy	+
X_4 = Access to market Information	1 if yes, otherwise 0	Dummy	+
X_5 = Distance to market	Number of kilometres	Continuous	+
X_6 = Land under vegetables under vegetables	Number of hectares	Continuous	+
X_7 = selling price	Emalangeni/kg	Continuous	+
X_8 = Quantity of each vegetable crop produced	Number of kilogrammes	Continuous	+
X_9 = Membership in farmer organisation	1 if member, otherwise 0	Dummy	+
X_{10} = Marketing agreement	1 if contracted, otherwise 0	Dummy	+

Distance to market was measured by kilometres from the production area to the market. The further the production area from the market, the less likely would be the farmer to participate in that vegetable market channel choice since he/she would not be realizing returns due to the perishable nature of vegetables, increased transportation charges and poor access to market information and facilities. Therefore, it was hypothesized that this variable would be negatively related to market channel choice.

Land cultivated under vegetables was measured in hectares. Farmland size is a surrogate for wealth (Feder et. al., 1985), thus it was hypothesized that this variable would be positively associated with the market channel choices. Selling price represented the price offered by the vegetable market channel in Emalangeni (E). Better price offered to farmers for their produce provides an incentive to farmers to participate in a market channel. It was expected that selling price would incentivize farmers to participate in a vegetable market channel that offered better prices. The quantity of vegetable crop produced represented the quantity of each of the six vegetables produced in the season, 2011 measured in kilogrammes. It was expected to influence market channel choice positively. The more the quantity of vegetables produced, the higher would be the chances of using a particular market channel. Membership in farmer organization was set as a dummy variable taking the value one if the farmer affiliated in a farmer organization and zero otherwise. Membership in an organization was considered a proxy for information access. It was expected that members are more likely to participate in a sustainable vegetable market channel (Sidibe, 2005). Marketing agreement was also set as a dummy variable, where the availability of a marketing agreement took the value one or zero otherwise. The availability of contractual agreements guarantees the availability of market, thus enabling market participation by vegetable farmers in commercial agriculture. This variable was expected to have a positive relationship with the choice of market channel.

4. Results and Discussion

4.1 Factors Affecting the Choice of Market Channel

The variables that were discussed in the previous section were considered for the model and tested for their significance. The multinomial logistic results on NAMBoard as a statutory wholesaler, non-wholesale as market channel choices were compared to other-wholesale market channels are presented in Table 2. The results show the estimated coefficients (β values), wald statistics and exponential betas of independent variables in the model. The results of the Cox and Snell R^2 show that 53% of the variation in the choice of marketing channel was a result of the independent variables.

The level of education was significant ($p<0.01$) and had a negative sign, which was not expected. It was expected that the level of education would positively influence the market channel choice. The logit coefficient for level of education was -27.335 and its exponential beta was 1.345E-12. This suggest that, other things being

equal, the odds of selling cabbages to NAMBoard market channel would be 1.345E-12 less than the odds of selling to other-market channel choice. It also implies that when farmers become literate the odds of selling cabbages to NAMBoard market channel would decrease by 99.99 %.

The logit coefficient for age was -0.100 and its exponential beta was 0.905. It means that the odds of selling to non-wholesale market channel were 0.905 times less than the odds of selling to other-wholesale market channel. Thus the odds of selling to non-wholesale market channel would decrease by 9.5% with an increase in age. These results imply that as the cabbage farmer ages, he/she would become more reluctant to adopt new market channels with different market requirements. Younger cabbage growers are more likely to sell to non-wholesale market channel because they are more adventurous and less risk averse than older farmers.

Land under vegetables was significant ($p < 0.01$) and positively related to choice of market channel as expected. The logit coefficient for land under vegetables was 0.732 and its exponential beta was 2.080, implying that the odds of selling cabbages to non-wholesale market channel were 2.080 times higher than the odds of selling to other-wholesale market channel. Thus the odds of selling to non-wholesale market channel would increase by 108% with an increase in land under vegetables by one unit.

Table 2. Multinomial logistic results for NAMBoard and non-wholesale market channel choice compared to other-wholesale market channel for cabbage

	NAMBoard			Non-wholesale		
Variables	β	Wald	Exp(β)	β	Wald	Exp(β)
Intercept	41.821	0		5.563	4.599	N/A
	-2090.452			-2.594		
Age (years)	0.19	2.316	1.21	-.100**	7.576	0.905
	-0.125			-0.036		
Land under vegetables (ha)	1.684	0.695	5.385	.732**	7.038	2.08
	-2.02			-0.276		
Distance to market (km)	0.038	1.071	1.039	-.048**	8.891	0.953
	-0.037			-0.016		
Selling price (E)	-2.451	1.125	0.086	-0.638	1.732	0.528
	-2.311			-0.485		
Quantity produced (kg)	0	1.857	1	0	0.76	1
	0			0		
Marketing agreement (yes = 1, no, 0)	3.833	0.433	46.213	4.566**	16.229	96.133
	-5.826			-1.133		
Membership in organisation (yes =1, no = 0)	0.66	0.017	1.935	-2.189*	4.357	0.112
	-5.081			-1.049		
Access to market information (yes = 1, no =0)	-5.45	1.298	0.004	0.457	0.278	1.579
	-4.784			-0.867		
Gender (male = 1, female = 0)	-19.193	0	4.62E-09	1.823	2.646	6.188
	-2090.444			-1.121		
Education (literate = 1, no = 0)	-27.335**	199.348	1.35E-12	-0.826	0.182	0.438
	-1.936			-1.936		

Cox and Snell R squared = .526; Nagelkerke R squared =.708; McFadden R squared = .550; -2log likelihood = 60.90; Chi-square = 74.59; df = 20; p = .000.

Distance to market was significant and negatively related to market channel choice as expected. The logit coefficient was -.048 and its exponential beta was 0.953 implying that with an increase in distance to market by one unit, the odds of selling cabbages to non-wholesale market channel would decrease by 0.953 times the odds of selling to other-wholesale market channel. Thus the odds of selling to non-wholesale market channel would decrease by 4.7% with an increase in distance by one unit.

A significant ($p<0.01$) relationship was found between marketing agreement and market channel choice.

Marketing agreement had a negative sign as expected. The logit coefficient for marketing agreement was 4.566 and its exponential beta was 96.133, implying that the odds of selling to non-wholesale market channel were 96.133 times higher than those of selling to other-wholesale market channel. Thus the odds of selling to non-wholesale market channel would increase by 9513.3 % with the presence of a marketing agreement.

Membership to farmer organization was significant ($p<0.05$) with a negative sign for non-wholesale market channel choice. These results are against the *a priori* expectations. Membership in farmer organization had a coefficient of -2.189 and an exponential beta of 0.112, implying that the odds of selling cabbages to non-wholesale market channel were 0.112 times less than the odds of selling to other-wholesale market channel. Thus, with a farmer being a member in an organization, the odds of selling to non-wholesale market channel would decrease by 88.8%. The possible reason is that these organizations are not marketing organizations, rather, they mainly provide some technical assistance and training and to a limited extent sale inputs.

The results in Table 3 reveal that the variable, education was significant ($p<0.01$) for NAMBoard as a carrot-market channel choice. The logit coefficient for level of education was -15.536 and its exponential beta was 1.790E-7. Thus the odds of selling to non-wholesale market channel will decrease by 99.99 % with an increase in the level of education of the farmer by one year.

Table 3. Multinomial logistic results for NAMBoard and non-wholesale market channel compared to other-wholesale market channel for carrot

	NAMBoard			Non-wholesale		
Variables	β	Wald	Exp(β)	β	Wald	Exp(β)
Intercept	29.941 (2323.043)	.000	N/A	29.744 (2323.041)	.000	N/A
Age (years)	.134 (.082)	2.684	1.143	.042 (.074)	.324	1.043
Land under vegetables(ha)	.485 (1.089)	.199	1.624	1.251 (1.074)	1.356	3.493
Distance to market (km)	.029 (.031)	.915	1.030	-.019 (.032)	.345	.981
Selling price (E)	.000 (.001)	3.355	1.000	.000 (.001)	.976	1.000
Quantity produced (kg)	-1.463 (.798)	.114	.232	-.326 (.330)	.402	.722
Marketing agreement (yes = 1, no = 0)	-1.642 (2.189)	3.299	.194	3.816* (1.867)	4.177.	45.405
Membership to organisation (yes =1, no = 0)	3.178 (2.425)	1.716	23.987	1.180 (2.259)	.273	3.254
Access to market information (yes = 1, no = 0)	-3.838 (2.113)	.563	.022	-3.513 (2.041)	2.963	.030
Gender (male = 1, female 0)	-20.267 (2323.041)	.000	1.579E-9	-17.344 (2323.041)	.000	2.936E-8
Education (literate = 1, illiterate = 0)	-15.536** (1.939)	64.180	1.790E-7	-13.832 (.000)	N/A	9.840E-7

Cox and Snell R squared = .566; Nagelkerke R squared =.762; McFadden R squared = .615; 2log likelihood = 52.13; Chi-square,= 83.36; df = 20; p = .000.

Reference category: other-wholesale market channel. ** and * show the statistically significant at 1% and 5% significance levels respectively. Numbers in brackets are standard errors.

The logit coefficient for marketing agreement was 3.816 and its exponential beta was 45.405, implying that the odds of selling to non-wholesale market channel were 45.405 times higher than the odds of selling to

other-wholesale market channel. Thus the odds of selling to non-wholesale market channel would increase by 4440.5 % with the presence of a marketing agreement, probably because of better prices. Using the Cox and Snell R squared, the explanatory variables explain 52% of the variation of the choice of marketing channel for carrot. Table 4 indicates that the explanatory variables account for 53% of the variation of the dependent variable. Education was significant ($p < 0.01$) for NAMBoard as an onion- market channel choice.

Table 4. Multinomial logistic results for NAMBoard and non-wholesale market channel compared to non-wholesale market channels for onion

	NAMBoard			Non-wholesale		
Variables	β	Wald	Exp(β)	β	Wald	Exp(β)
intercept	25.531 (2379.243)	.000	N/A	29.464 (2379.242)	.000	N/A
Age (years)	.122 (.077)	.122	1.130	.036 (.071)	.250	1.036
Land under vegetables (ha)	.600 (1.049)	.327	1.822	1.218 (1.046)	1.357	3.381
Distance to market (km)	.033 (.032)	1.050	1.033	-.021 (.034)	.402	.979
Selling price (E)	.000 (.001)	2.874	1.000	.000 (.001)	.000	1.000
Quantity produced (kg)	-.600 (.354)	.204	.549	-.003 (.247)	.207	.997
Marketing agreement (yes = 1, no = 0)	-1.211 (1.952)	.385	.298	3.693* (1.729)	4.561	40.166
Membership in farmer organisation (yes = 1, no =0)	2.640 (2.388)	1.223	14.015	.628 (2.306)	.074	1.874
Access to market information (yes = 1, no = 0)	-3.169 (1.950)	2.641	.042	-3.027 (1.903)	2.530	.048
Gender (male = 1, no = 0)	-17.984 (2379.242)	.000	1.548E-8	-16.144 (2379.242)	.000	9.740E-8
Education	-13.797** (2.179)	40.073	1.019E-6	-14.806 (.000)	N/A	3.713E-7

Cox and Snell R squared = .532; Nagelkerke R squared =.717; McFadden R squared = .561; 2log likelihood = 59.53; Chi-square = 75.96; df = 20; p = .000.

Reference category: other-wholesale market channel. ** and * show the statistically significant at 1% and 5% significance levels respectively. Numbers in the brackets are standard errors.

The logit coefficient for level of education was -13.797 and its exponential beta was 1.0190E-6, implying that the odds of selling onion to NAMBoard would decrease by 1.0190E-6 times less than the odds of selling to other-wholesale market channel. Thus the odds of selling to NAMBoard market channel would decrease by 99.99 % with an increase in level of education by one year.

As expected a positive and significant ($p<0.01$) relationship was found between the availability of marketing agreement and market channel choice. The logit coefficient for marketing agreement was 3.693 and its exponential beta was 40.166, implying that the odds of selling to non-wholesale market channel is 40.166 times higher than the odds of selling to other-wholesale market channel. Thus the odds of selling to non-wholesale market channel would increase by 3916.6% with the presence of a marketing agreement.

Table 5 indicates that education of the farmer was significant ($p < 0.01$) for NAMBoard as a tomato-market

channel choice. The logit coefficient for education was -8.668 and its exponential beta was 0.000, implying that the odds of selling to NAMBoard market channel would decrease by 100% with a decrease in the level of education by one year.

A positive and significant ($p<0.01$) relationship was found between non-wholesale market channel and the availability of marketing agreements as expected. The logit coefficient for marketing agreement was 4.321 and its exponential beta was 75.268, implying that the odds of using non-wholesale market channel were 75.268 times higher than the odds of using other-wholesale market channel. Thus the odds of selling to non-wholesale market channel would increase by 7426.8% with the presence of a marketing agreement.

Distance to market had a negative relationship with non-wholesale market channel. These results are in conformity with *a priori* expectations. The coefficient of distance to market was -0.044 and its exponential beta was 0.957 implying that with an increase in distance to market by one unit, the odds of selling tomatoes to non-wholesale market channel were 0.957 times less than the odds of selling to other-wholesale market channel. Thus the odds of selling to non-wholesale market channel would decrease by 4.3 % with an increase in distance by one unit. These results indicate that the vegetable farmers are sensitive to transaction costs. The Cox and Snell R squared suggest that 53% of the variation the choice of marketing channel for tomato is explained by the explanatory variables.

Table 5. Multinomial logistic results for NAMBoard and non-wholesale market channel compared to other-wholesale market channels for tomato

	NAMBoard			Non-wholesale		
Variables	β	Wald	Exp(β)	β	Wald	Exp(β)
Intercept	24.016 (3159.897)	.000		4.043 (2.372)	2.906	
Age (years)	.112 (.075)	2.203	1.118	-.086* (.034)	6.310	.917
Land under vegetables (ha)	2.191 (2.077)	1.113	8.945	.379 (.256)	2.184	1.460
Distance to market (km)	.019 (.037)	.267	1.019	-.044** (.015)	8.970	.957
Selling price (E)	-.765 (.593)	1.662	.466	-.078 (.245)	.100	.925
Quantity produced (kg)	.000 (.000)	1.261	1.000	.000 (.000)	1.198	1.000
Marketing agreement (yes = 1, no = 0)	1.120 (3.726)	.090	3.065	4.321** (1.083)	15.924	75.268
Membership in farmer organisation (yes = 1, No = 0)	-.994 (4.794)	.043	.370	-1.652 (1.007)	2.690	.192
Access to market information (yes = 1, no = 0)	-4.943 (3.312)	N/A	.007	.844 (.874)	.934	2.326
Gender (male = 1, female = 0)	-16.789 (3159.894)	.000	5.114E-8	1.936 (1.094)	3.130	6.931
Education (literate = 1, illiterate = 0)	-8.668** (1.837)	22.272	.000	-.766 (1.837)	.174	.465

Cox and Snell R squared = .530; Nagelkerke R squared =.714; McFadden R squared = .557; 2log likelihood = 60.00; Chi-square = 75.49; df = 20; p = .000

Reference category: other-wholesale market channel. ** and* show statistically significance at 1% and 5% significance levels respectively. Numbers in brackets are standard errors

The results in Table 6 reveal that there is a positive relationship between age of the farmer and NAMBoard market channel choice. The logit coefficient for age was 0.142 and its exponential beta value was 1.152. This suggests that with each additional year of age, the odds of selling cabbages to non-wholesale market channel were 1.152 times higher than the odds of selling to NAMBoard market channel. Thus the odds of selling to NAMBoard market channel would increase by 15.2% with an increase in age.

Table 6. Multinomial logistic results for NAMBoard and non-wholesale market channel compared to other-wholesale market channels for baby corn

	NAMBoard			Non-wholesale		
Variables	β	Wald	Exp(β)	β	Wald	Exp(β)
Intercept	23.518 (3583.951)	.000		29.079 (3583.951)	.000	
Age (years)	.142* (.072)	3.912	1.152	.031 (.063)	.237	1.031
Land under vegetables (ha)	.339 (1.013)	.112	1.403	1.066 (1.008)	1.117	2.903
Distance to market (km)	.038 (.033)	1.337	1.039	-.015 (.034)	.193	.985
Selling price (E)	.000 (1.474)	52.085	.999	.000 (1.474)	N/A	1.000
Quantity produced (kg)	.805** (.111)	.000	2.236	.623 (.000)	.000	1.865
Marketing agreement (yes = 1, no =)	-1.163 (1.942)	1.942	.312	3.503* (1.634)	4.595	33.219
Membership in organisation (yes = 1, no =0)	2.324 (2.123)	2.123	10.215	.444 (1.972)	.051	1.559
Access to market information (ye = 1, no = 0)	-3.260 (1.789)	3.320	.038	-2.620 (1.682)	2.425	.073
Gender (male = 1, no = 0)	-18.242 (1420.222)	.000	1.196E-8	-15.970 (1420.222)	.000	1.160E-7
Education	-12.696 (3290.549)	.000	3.063E-6	-13.912 (3290.549)	.000	9.077E-7

Cox and Snell R squared = .503; Nagelkerke R squared =.678; McFadden R squared = .516; 2log likelihood = 65.61; Chi-square = 69.88; df = 20; p = .000.

Reference category: other-wholesale market channel. ** and * show statistical significance at 1% and 5% probability level respectively. Numbers in the brackets are standard errors.

The logit coefficient for quantity of baby corn produced was 0.805 and its exponential beta was 2.236 implying that, other things being equal, the odds of selling baby corn to NAMBoard market channel were 2.236 times higher than the odds of selling to NAMBoard wholesale market channel. Hence, the odds of selling to NAMBoard wholesale market channel would increase by 123.6% with an increase in the quantity of baby corn produced by one unit.

A positive and significant relationship ($p<0.05$) was found between non-wholesale market channel and the availability of marketing agreement. The logit coefficient for marketing agreement was 3.503 and its exponential beta was 33.219, implying that the odds of selling to non-wholesale market channel were 33.219 times higher than the odds of selling to other-wholesale market channel. Thus the odds of selling to non-wholesale market channel would increase by 3221.9% with the presence of a marketing agreement. There is sufficient evidence to support that the availability of a marketing agreement is likely to encourage baby corn growers to market their produce through wholesale market channel. The results show that 50% of the variation in the dependent variable is explained by the independent variables.

Table 7. Multinomial logistic results for NAMBoard and non-wholesale market channel compared to other-wholesale market channel for baby marrow

	NAMBoard			Non-wholesale		
Variables	β	Wald	Exp(β)	β	Wald	Exp(β)
Intercept	25.893 (2174.769)	.000	N/A	30.536 (2174.768)	.000	N/A
Age (years)	.133 (.073)	3.314	1.143	.042 (.067)	.380	1.042
Land under vegetables (ha)	.425 (.917)	.215	1.530	.963 (.915)	1.106	2.618
Distance to market (km)	2.690 (611.230)	1.187	14.730	5.675 (613.009)	.189	291.531
Selling price (E)	.029 (.026)	.000	1.029	-.012 (.028)	.000	.988
Quantity produced (kg/ha)	-.002 (.484)	.000	.998	-.079 (1.182)	.004	.924
Marketing agreement (yes = 1, no = 0)	.090 (2.320)	.002	1.095	4.181* (2.142)	3.812	65.445
Membership in organisation (yes = , no = 0)	1.854 (2.637)	.494	6.386	-.149 (2.503)	.004	.861
Access to market information (yes =, no = 0)	-3.742 (2.261)	2.739	.024	-3.342 (2.150)	2.417	.035
Gender (male = 1, female= 0)	-19.003 (2174.768)	.000	5.586E-9	-17.154 (2174.768)	.000	3.549E-8
Education (literate = 1, illiterate = 0)	-13.583** (1.686)	64.917	1.262E-6	-14.068 (.000)	N/A	7.767E-7

Cox and Snell R squared = .521; Nagelkerke R squared =.702; McFadden R squared= .543; 2log likelihood = 61.94; Chi-square = 73.55; df = 20; p = .000

Reference category: other-wholesaler market channel. ** and * show statistical significance at 1% and 10% respectively. Numbers in the brackets are standard errors.

Table 7 indicates that the level of education had a negative relationship with NAMBoard market channel. The logit coefficient for education was -13.583 and its exponential beta was 1.262E-6, implying that the odds of

selling baby marrow to NAMBoard market channel would be less by 1.262E-6 times the odds of selling to other-wholesale market channel. Thus the odds of selling to NAMBoard wholesale market channel would decrease by 99.99% when the farmer is illiterate with an increase in education by one year.

A positive and significant ($p<0.10$) relationship was found between non-wholesale market channel and marketing agreement as indicated in Table 7. The *a priori* expectations hold true for non-wholesale market channel only, but not for NAMBoard market channel. The logit coefficient for marketing agreement was 4.181 and its exponential beta was 65.445, implying that the odds of selling to non-wholesale market channel were 65.445 times higher than the odds of selling to other-wholesale market channel. Thus the odds of selling to non-wholesale market channel would increase by 6444.5% with the presence of a marketing agreement. There is sufficient evidence to support that the availability of a marketing agreement is likely to encourage baby marrow growers to market their produce through non-wholesaler market channels over and above other wholesalers. About 52% of the variation in the choice of marketing channel for baby marrow is explained by the explanatory variables.

4. Conclusions

The age of the farmer, quantity of baby corn produced and education are important predictors of the choice to sell vegetables to NAMBoard market channel instead of selling to other-wholesale market channel. The choice of farmers to sell vegetables to the NAMBoard market channel instead of selling to other wholesale market channels was influenced by farmers' age, quantity of baby corn produced, and level of education. While the choice to sell to non wholesale market channel over other wholesale market channels was influenced by age of the famer distance to market, membership in market organization, and marketing agreements. There seems to be an opportunity to improve market channel choice participation if each one of the factors could be improved.

5. Recommendations

The results of the study showed that vegetable farmers were able to access non-wholesale markets when they are members in farmer organizations. It is therefore important to promote collective action as an institutional vehicle for linking farmers to agribusiness supply chains. Collective action is encouraged because it strengthens smallholders' market position and bargaining power. Farmers should establish networks since they aid in sharing knowledge, farmers can improve produce grades as required by market. Vegetable farmers should be encouraged to engage in enforceable contract farming or agreements, since they could be a way of improving farmers' product quality and ensuring market availability. There is also a need to improve the collection of vegetables from farmers by NAMBoard because distance becomes a constraint in using it as a market.

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