

THE INFLUENCE OF FARMER CHARACTERISTICS ON PERFORMANCE OF COMMERCIAL FARMERS IN KIAMBU COUNTY, KENYA

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ABSTRACT

The objective of this study was to examine the influence of farmer characteristics on performance of commercial farmers in Kiambu County, Kenya. Data was collected using a semi structured questionnaire and analyzed using both descriptive and inferential statistics. Majority of the respondents were males aged 40 years and above. The respondents had acquired a minimum of secondary level of education and had over 5 years experience in farming fresh fruits and vegetables. Majority of the farms were 2 acres and below and were owned by either families or individuals. The main sources of funding were table banking and farm sales income. The study established a statistically significant relationship between farmer characteristics and performance of commercial farmers. The study was limited by the narrow scope which focused on few constructs and self reported data with no collaborative evidence. The study recommends that farmers should enhance their abilities by joining associations, improving their education and agricultural training and increasing their funding so as to improve their performance. The government should set up the requisite infrastructure and provide the facilitation and resources required to enlighten and support farmers in their farming initiatives. Future research should target other fresh agricultural products; increase the variables and constructs being investigated and target other counties with differing social economic and climatic conditions. A study designed with farmer characteristics as the independent variable and branding practice as the dependent variable would add new dimensions to observed interactions and unveil extra interactions and relationships.

Key words: Farmer Characteristics, Commercial Farmers, Performance of Commercial Farmers, Fresh Fruits and Vegetables

INTRODUCTION

Commercial Farmers' demographic characteristics affect their performance capabilities in different ways. According to Sindi (2008), the mature farmers are more experienced and have more access to required resource as compared to the young ones. The young farmers were found to be more accommodative of new ideas. Male farmers had easy access to credit, extension services and other farm inputs while female farmers had constraints in acquiring resources including modern technology. Farmers with secondary school level agricultural education used the right inputs leading to better performance (Saina, Kathuri, Rono, Kipsat & Sulo, 2012). Cooperative membership facilitated access to credit and other facilities (Verhofstadt & Maertens, 2013) and also enabled farmers to lobby for government support including extension services. Farmers who were more capitalized and technically and financially empowered were more effective in farming and marketing (Neven & Reardon, 2006). The farms were owned either by individuals or family members as sole proprietors (Derden-Little, Erin & Feenstr, 2006) or by cooperatives, partnerships or limited liability companies (Verhostadt & Maertens, 2013).

Kinyua-Njuguna (2013) presents firm performance as the actual output of an organization measured against its intended outputs. Edwards (2013) contends that farmers need to establish the financial performance of their farms in order to assess the profitability, debt capacity and financial risks of their operations. Both financial and non financial parameters are used to measure firm performance. Product output, price premium, profitability and satisfaction were the performance measures adopted for this study since as established by Ailawadi, Lehmann and Neslin (2002), they are easy to assign and are consistent with the focus of business executives.

Kiambu County has a wide agro-ecological zone which enables the county to produce tropical FFV such as bananas and mangoes as well as temperate ones such as peaches and plums. The County also has a fast growing urban and sub urban population and is experiencing high unemployment (County Government of Kiambu, 2012). Fresh fruits and vegetables (FFV) have a high value added per unit of land since they are labour and management intensive per crop and two or more crops can be grown per year. This makes their growing the most appropriate form of farming in the County (Government of Kenya, 2012). To increase its commercialization, FFV farmers in the County need to be empowered by acquiring the necessary skills and finances in order to engage in value addition and other performance enhancing activities.

Statement of the Problem

The strategic thrust for the agricultural sector in Kenya is to increase productivity, commercialization, and competitiveness of agricultural commodities by transforming small holder agriculture from subsistence to an innovative, commercially oriented and a modern sector (Ministry of Agriculture, 2012). This requires that farmers be empowered to enable them effectively engage in such value addition activities as product processing, branding, quality certification and farm level quality improvements. Consequently, the influence of *farmers' characteristics on performance (Evenson & Mwabu, 1998) has to be established.*

In their study, Verhofstadt and Maertens (2013) established that membership in cooperatives impacted positively the volumes sold and income generated in Rwanda. The study was not sector specific and did not consider the impact of farmer characteristics on performance. The study also relied only on descriptive analysis and was location variant. Evenson and Mwabu (1998) analyzed data from the Central Bureau of Statistics and established that extension services, experience, male gender, education and highlands

ecological zones improved farm productivity. The study relied on secondary data and measured performance only in terms of volume productivity. McCulloch and Ota (2002) compared performance data from horticultural and non horticultural farmers and workers in Nairobi and Mount Kenya regions and concluded that export horticulture contributes to an increase in income, job creation, access to credit and extension services. However, this study relied on descriptive data analysis and ignored the influence of farmer characteristics in enhancing performance.

The shortcomings noted in the reviewed studies necessitated the current study to bridge the identified gaps. The data in the cited studies was subjected only to descriptive analysis which restricted the depth of analysis and the establishment of underlying relationships. To bridge the identified gaps, the current study utilized descriptive and inferential statistics and undertook linear regression and correlation analysis of the secured data. The study simultaneously considered different constructs under farmer characteristics and performance and addressed the research question: what is the influence of farmer characteristics on the performance of commercial farmers in Kiambu County? The hypothesized relationship stated that:

H1: There is a statistically significant relationship between commercial farmer characteristics and performance of commercial farmers in Kiambu County.

REVIEW OF RELATED LITERATURE

Two broad categories of farming have been identified. In subsistence farming, nearly all the crops or livestock raised are used to maintain the family, with little or no surplus for sale. Commercial farmers engage in either small holder or large scale production primarily for sale with a profit objective (Poulton, Tyler, Hazel, Doward, Kyudd & Stockbridge, 2008). They use superior inputs and machinery resulting in higher performance (Chapoto & Bonus, 2013).

The social economic characteristics of commercial farmers which affect performance can be grouped according to farm ownership structure and demographic characteristics. Ownership structure includes sole proprietorship, general partnership, Limited Liability Company and cooperatives. While some farmers engage in farming initiatives as individuals (Derden-Little, Erin & Feenstr, 2006), others do so as organization members. Membership in cooperatives has a strong positive effect on performance. Cooperatives enhance agricultural intensification, value of inputs, commercialization, gross revenue and net income (Verhofstadt, 2013; Tolawase & Apata, 2012). Membership in cooperatives allows farmers' easy access to information, capital, reduces cost of operations and strengthens their negotiation ability.

Farmers' demographic characteristics which influence their performance include age, household size, formal education, size of farm, experience in farming, farm income, nonfarm income, adoption of modern farming methods, land ownership and ownership of farm equipment (McCulloch & Ota, 2002). In their study on farmer characteristics and agricultural productivity in Kenya, Saina et al. (2012) established that secondary school agricultural education enables farmers to have a broader capacity, be more effective, self reliant, resourceful and capable of solving farming problems thereby improving their crop productivity. *In Netherlands*, Bremmer, Alfons, Lansink, Olson, Baltussen, and Huirne (2002) *sampled 141 farms with 122 responses and established that farmer's age, off farm income and family labour input have no significant relationship with farm development while mechanization has a high marginal impact on farm development.* Oluwatusin and Shittu (2014) found that yam production in Nigeria was positively influenced by age, educational level, farming experience, farm distance from residence and income level of the farmers. A

study on performance of Agritourism farms in South Africa by Barbieri and Mshenga (2008) established that male gender, white operators, length of time in business, number of employees and farm acreage had a positive impact on annual gross sales of agritourism farms. Other characteristics like location, business plans, sources of start-up capital and the entrepreneur's education level were found not to have a significant impact on performance of these farms.

In a study on the impact of farm credit on farmer's socio-economic status in Nigeria, Bolarinwa and Fakoya (2011) established a positive and significant correlation between performance of farms and access to credit for crop production, adoption of new technologies and proper processing, storage and utilization of information. Agricultural credit facilities influenced farmers' crops production and income level leading to a positive and significant relationship between loan credit and farmers performance. Similarly, Sossou, **Noma** and **Yabi** (2014) found that loan credit for agricultural materials had a positive impact only for educated farmers' thereby connecting efficiency of loan credit to academic qualification of farmers. They further established that farm revenue is positively correlated with among other factors, land acreage, quantity of labour, cost of fertilizers and insecticides and size and gender of the household head. A household with more than 10 members and a woman as head was found to have lower technical efficiency. Crop insurance schemes were also found to positively impact farm performance (Nwosu, et al., 2010). Apart from insurance, other socio-economic characteristics that influenced performance included educational level; farming experience; farm size and number of technologies used in the farm while age, sex and household size had insignificant contribution.

Evenson and Mwabu (1998) established that male farmers had higher yields due to greater ability to access facilities and labour. Productivity was influenced by nonfarm income, size of farm and access to capital and markets. Dunaway (2013) established that even though large farms encounter problems of liquidity and solvency, they are better placed in profitability, efficiency, and repayment capacity. Toluwase and Apata (2012) found that farmers acquired more experience with age leading to improved agricultural productivity and that they enhanced their entrepreneurial ability by joining cooperatives to gain easy access to information, capital, reduced operational costs and enhanced negotiation skills.

Farmers with relevant academic qualifications were found to be more suitable to undertake such initiatives like product branding and promotions that create a premium status for the product leading to improved performance. Education increases their capacity and resourcefulness in undertaking commercial decisions that improve their performance (Saina et al., 2012). Mechanization has greater impact on farm development and performance than personal characteristics and farm ownership (Bremmer et al., 2002).

METHODOLOGY

To establish the associations among farmer characteristics and performance, a descriptive cross sectional survey design was adopted. This design facilitated in establishing and describing the relationships among the key study variables (Kothari, 2004). It was cross sectional since it was conducted once to pick the parameters of a phenomenon at a specific time with an aim of accurately capturing the characteristics of the population relating to what, where, how and when of a research topic (Cooper & Schindler, 2003).

The population of the study consisted of 213 commercial farmers of FFV in Kiambu County. The population consisted of individual farmers (male & female), women groups, resident groups, cooperatives, limited liability companies and government departments growing between one and three crops in farms ranging between 5.5 to 0.125 acres. They engaged in farming activities to generate income. This study adopted stratified random sampling which allowed for making of probability based confidence estimates of various parameters (Cooper & Schindler, 2003). The key target was the owners or managers of commercial FFV farms. From the target population, the farmers were stratified into seven sub-counties and a proportionate sample drawn relative to the size of each. To determine the sample size, a formula proposed by Israel (2009) was applied as follows:

$$n = \frac{N}{1+N(e)^2}$$
 where **n** is sample size, **N** is the population size, and **e** is the error term (0.05). Using **N = 213** in the formula, the resulting sample size (**n**) is **140** farmers.

The data was collected using a semi structured questionnaire through the direct interrogation method (Cooper & Schindler, 2003). The questionnaire was administered directly to the respondents through the assistance of Agricultural Extension Officers who were recruited as research assistants due to their close association with the farmers. The extension officers offer technical advice and other related services to the farmers in their normal day to day activities.

The study variables were operationalized and measured using direct measures and 4 point rating scales ranging from 1=Not important to 4=Very important; 1=Not strong to 4=Very strong; 1=Not at all to 4=Great extent. Data was analyzed using both descriptive statistics (frequencies, percentages, mean and standard deviation) and inferential statistics (chi square, linear regression and correlation analysis). Stepwise regression analyses were used to bring out the individual effects in the form: $Y_1 = a_0 + b_1X_1 + e_1$; for effect of BP on performance of commercial farmers.

Table 1: Study Hypotheses, Analysis Methods and Interpretation of Results

Objective	Hypotheses	Analysis Methods	Interpretation of results
Examine the relationship between farmer characteristics and the performance of commercial farmers.	H ₂ : There is a statistically significant relationship between Farmer characteristics and performance of commercial farmers.	Multiple linear regression model: Performance of commercial farmers = f(farmer Characteristics (FC)): $Y_1 = a_0 + b_1X_1 + b_2X_2 + \dots + b_7X_7$; where: Y_1 = composite index for performance of commercial farmers; a_0 = intersect constant; b_1, b_2, \dots, b_7 = regression coefficients: whereby; X_1 = demographic characteristics, X_2 = membership to associations, X_3 = source of funding; X_4 = production facilities; X_5 = Size of farm; X_6 = farm ownership; X_7 = agricultural training.	The value of R^2 , Product moment correlation (R). Regression coefficient and conduct an F test (ANOVA).

PRESENTATION AND ANALYSIS OF EMPIRICAL RESULTS

The data used for this research was corrected from 140 farmers spread across seven sub-counties in Kiambu County. The 140 questionnaires were successfully filled and found suitable for further analysis resulting in a response rate of 100%. This compared favourably with a similar study conducted among farmers by Bremmer et al. (2002) which had a response rate of 86.5%.

Reliability and Validity

The study sought to establish the reliability of the research instrument by computing the Cronbach's Alpha coefficient in regard to the elements in the study variables. The Cronbach's Alpha reliability coefficients indicated reliability level of the instrument at 0.7364. The level was above the acceptable minimum value of 0.50 (Cronbach, 1951) and above the recommended value of 0.7 (Nunnally & Bernstein, 1994). The internal consistency of the measures used was therefore considered to have adequately measured the relevant study variables.

DESCRIPTIVE STATISTICS

Characteristics of Respondent Commercial Farmers

Farmer characteristics constituted the independent variable of the study. The constructs investigated to evaluate their effect on performance of commercial farmers included farmers' gender, age, education level, membership to associations, farm size, farm ownership, production facilities, funding and agricultural training. Academic qualifications and training influence managerial skills while membership to associations assists in securing markets and government support.

Summary on Farmer Characteristics

Table 2 contains a summary of the individual characteristics of the respondent commercial farmers.

Table 2: Summary of Commercial Farmer Characteristics

Farmer Characteristics	N	Mean Score	Standard Deviation	CV (%)
Demographic characteristics	140	2.30	0.498	21.65
Membership to Associations	84	1.54	0.474	30.78
Source of funding	140	2.39	0.752	31.41
Production Facilities	133	1.28	0.354	27.66
Farm size	140	2.86	1.437	50.24
Farm ownership	140	2.26	1.728	76.46
Training	140	1.96	0.812	41.43
Overall Average Score	-	2.08	0.865	41.49

Source: Primary data.

The summary results in Table 2 present average mean scores (mean score=2.08, CV=41.49) implying that all farmer characteristics contributed at an average level to performance of commercial farmers. The characteristics considered to make the greatest contribution were demographic characteristics (mean score=2.30, CV=21.65), source of funding (mean score=2.39, CV=31.41) and farm size (mean score=2.86, CV=50.24). The characteristics reported to be of least importance were membership to associations (mean score=1.54, CV=30.78) and production facilities (mean score=1.28, CV=27.66).

At an individual construct level, the results indicated that male respondents in all age categories were involved in farming of FFV and accounted for majority of the respondents. The results further indicated that majority of the farmers had achieved a minimum of form four level of education and were therefore academically empowered to engage in effective commercial farming of FFV. Similarly, majority of the respondent farmers had attended short agricultural courses and had over three years experience in their FFV farming activities. There were three alternative membership associations' namely cooperative societies, women's groups and resident's groups that the respondent farmers could belong to. The results revealed low membership to any of the association. This implied that farming of fresh fruits and vegetables in the County was largely an individual activity whereby all the functions are undertaken at an individual level.

The results also established that majority of the farmers cultivated small farm units ranging between 0.5-2 acres. Female respondents had on average smaller farm sizes than their male counterparts. Most of these farm units were owned either by individual farmers or by families. The results further indicated that even those not owning land participated in FFV farming through land leasing and land renting arrangements. The results further revealed the main sources of labour to be family members, hired workers and a combination of both family members and hired workers. The main sources of funding were table banking, farm sales

income and sales from others farming activities. Among the services utilized in the farms, the respondents relied mainly on government extension services and hired transport. The results indicated limited access to refrigeration equipments and packaging machines with the few available being individually owned.

Performance of Commercial Fresh Fruits and Vegetable Farmers

The constructs used to describe performance of commercial farmers were price, volume, profitability and satisfaction achieved by the respondent farmers. Table 3 contains a summary of the individual indicators of the achieved performance.

Table 3: Summary on Performance of Commercial Farmers

Indicators of Performance of Farmers	N	Mean score	Standard Deviation	C.V (%)
Price premium	99	1.25	0.493	39.41
Sales Volume	126	1.59	1.089	68.62
Profitability	124	1.51	0.917	60.68
Satisfaction	140	2.72	0.619	22.77
Overall Average Score	-	1.77	0.780	44.11

The summary results in Table 3 show low overall average levels of performance of commercial farmers (mean score=1.90, CV=40.23). Farmer satisfaction had the highest mean score (mean score=2.72, CV=22.77) implying that on average, farmers were satisfied with their undertakings. Price premium had the lowest mean score (mean score=1.25, CV=39.41) which indicated that the farmers were not earning the price premiums they expected.

At an individual performance construct level, prices for own products were found to be lower than those for competitor branded products from within and outside the County. Own products earned higher prices than competitor non-branded products from within and outside the county.

There was an increase in those earning profits from FFV farming between the years 2012 to 2014. Results on the extent to which the respondent farmers were satisfied with the achieved price, volume and profitability revealed average levels of satisfaction with the three indicators. However, volume harvested and price earned had slightly higher levels of satisfaction compared to profitability.

Correlation Analysis Results

The general objective of this study was to establish the influence of farmer characteristics on the performance of commercial farmers (PCF) in Kiambu County. In order to assess the relationship between the independent variable and the dependent variable a correlation analysis was conducted. Results of the analysis are presented in table 4.

Table 4: Correlation for Farmer Characteristics and Performance of Commercial Farmers

Correlations

		Performance of commercial farmers	Farmer characteristics
Performance of commercial farmers	Pearson Correlation	1	.234**
	Sig. (2-tailed)		.005
	N	140	140
Farmer characteristics	Pearson Correlation	.234**	1
	Sig. (2-tailed)	.005	
	N	140	140

** . Correlation is significant at the 0.01 level (2-tailed).

The results of the Pearson’s product moment correlation analysis as presented in Table 4 show that farmer characteristics are significantly correlated with performance of commercial farmers ($r= 0.234$; $p < 0.01$ and sig. 2 tailed = $0.005 < 0.05$). The results suggest that an empowered commercial farmer undertaking farming activities of fresh fruits and vegetables will achieve improved performance.

Results of Regression Analysis and Hypothesis Testing

This study was based on the premise that the performance of commercial farmers in Kiambu County was influenced by farmer characteristics. In order to test the resulting hypothesis, simple and stepwise multiple linear regression analyses were conducted at 95 percent confidence level. Since farmer characteristics and performance of commercial farmers were measured using more than one construct; each performance indicator was regressed against each dimension of independent and dependent variables using simple regression analysis. To evaluate the contribution of each construct in the independent variable, stepwise multiple regression analysis was carried out.

Results of Simple Regression: Farmer Characteristics

To evaluate the influence of farmer characteristics (independent variable (IV) on performance of commercial farmers (dependent variables (DV), simple regression analyses were conducted for each pair of variables. The results are contained in Table 5.

Table 5: Simple Regression: Farmer Characteristics

	Farmers Characteristics
R	0.234
R ²	0.055
F	7.968
Sig (p)	0.005
Constant	1.012
B	0.420
s.e.	0.149
Beta	0.234
T	2.823
Sig (p)	0.005

Where: B = Un-standardized coefficient; s.e. = Standard error; beta= Standardized Coefficient ; R²=coefficient of determination; P=Significance of the regression

Dependent Variable: Performance of Commercial Farmers

Independent Variables: Farmer Characteristics

The simple regression results presented in Table 5 produced an R² of 0.055 for farmer characteristics. The results imply that farmer characteristics accounted for 5.5% of the variation of the performance of commercial farmers. The results further reveal a statistically significant relationship between farmer characteristics and performance of commercial farmers (beta=0.234, P=0.005). Based on these results, we accept the hypothesis at 5% significance and conclude that farmer characteristics influenced the performance of commercial farmers. The statistically significant relationships between performance of commercial farmers and farmer characteristics imply that empowered farmers are able to undertake effective farming practices with positive results.

Multiple Regression Model: Dimensions of Farmer Characteristics and Performance of Commercial Farmers

To assess the influence of farmer characteristics on Performance of commercial farmers, the research had set the following hypothesis:

H1: There is a statistically significant relationship between farmer characteristics and performance of commercial farmers in Kiambu County.

The multiple regression results of farmer characteristics regressed against each dimension of performance are presented in Table 6.

Table 6: Regression of Farmer Characteristics on Performance of Commercial Farmers

Coefficients^a

i) Price					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	.647	.268		2.411	.018
Farmer Characteristics	.298	.130	.227	2.295	.024

a. Dependent Variable: Price

ii) Volume					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	.601	.508		1.183	.239
Farmer Characteristics	.473	.239	.175	1.977	.050

a. Dependent Variable: Volume

iii) Profitability					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	.581	.428		1.357	.177
Farmer Characteristics	.446	.202	.196	2.213	.029

a. Dependent Variable: Profitability

iv). Satisfaction					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	2.614	.267		9.789	.000
Farmer Characteristics	.050	.124	.035	.407	.685

a. Dependent Variable: Satisfaction

The results revealed a statistically significant linear relationship between farmer characteristics and price (beta 0.227, p-value=0.024) farmer characteristics and profitability (beta 0.196, p-value=0.029) and farmer characteristics and volume (beta 0.175, p-value=0.050). The results revealed a statistically insignificant relationship between farmer characteristics and satisfaction (beta 0.035, p-value=0.685). The statistically significant relationship between farmer characteristics and price, volume and profitability suggests that farmer characteristics positively influenced the three performance measures of commercial farmers. There is however no significant relationship between farmer characteristics and satisfaction. The statistically insignificant relationship between farmer characteristics and satisfaction implies that it was not possible to attribute any specific farmer characteristic to a specific level of satisfaction with the price, volume and profitability achieved.

Table 7 presents the aggregate mean scores of performance when regressed against aggregate mean scores of farmer characteristics.

Table 7A: Results of Goodness-of-Fit of the Regression of Performance of Commercial Farmers on Farmer Characteristics

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.234 ^a	.055	.048	.74509
a. Predictors: (Constant), Farmer characteristics				
Dependent variable: Performance of Commercial Farmers				

Table 7B: Significance of the Regression of Performance of Commercial Farmers on Farmer Characteristics

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.012	.320		3.159	.002
	Farmer characteristics	.420	.149	.234	2.823	.005
Dependent Variable: Performance of commercial farmers						

Regression of the aggregate mean scores of performance of commercial farmers against farmer characteristics revealed a statistically significant positive relationship between farmer characteristics and performance of commercial farmers ($\beta=0.234$, $p\text{-value}=0.005$). Therefore, we accept the hypothesis at 5% significance and conclude that farmer characteristics had statistically significant influence on performance of commercial farmers. Farmer characteristics influenced the ability of farmers to achieve superior performance.

Based on the results in Tables 7A and 7B, a simple regression equation can be used to estimate performance of commercial farmers in Kiambu County as follows:

$$Y = 1.012 + 0.234FC$$

Where

Y= Performance of Commercial Farmers

FC= Farmer Characteristics

1.012= y-intercept; constant

0.234= an estimate of the expected increase in performance of Commercial Farmers in response to a unit increase in farmer characteristics

The regression coefficient of 1.012 under constant indicates the value of performance when farmer characteristic is at zero. The regression coefficient of 0.234 implies that a unit increase in farmer characteristics would lead to a 0.234 increase in Performance of commercial farmers. We therefore conclude that farmer characteristics contribute significantly to prediction of the performance of commercial farmers.

Discussion of the Results

These discussions are based on the results of correlation and hypothesis tests and the results established in earlier sections. Farmer characteristics consisted of eight measurement constructs namely demographic characteristics (age, gender, education level and experience), membership to associations, accessing production facilities, farm size, sources of funding, farm ownership and agricultural training. Data analysis was conducted for both the joint constructs of farmer characteristics and at individual level of each construct. The combined results indicated that farmer characteristics had statistically significant influence on performance of commercial farmers. The result was supported by the findings of Verhofstadt and Maertens (2013) which indicated that membership in cooperatives will lead to enhanced performance. Farmers with membership in associations had greater bargaining power and better access to more lucrative markets which yielded higher prices. Higher prices will lead to increased profitability. Most of the respondent farmers were found to be academically empowered and therefore, the results confirm the findings by Saina et al. (2012) that secondary school agricultural education improved the farmer's capacity resulting in improved performance.

Recommendations

Based on findings of the study, the following recommendations are made to commercial farmers. First, the study has established that farmer characteristics influenced both financial and non financial performance of commercial farmers. The farmers should therefore enhance their abilities through such initiatives as joining associations, improving their education and agricultural training, acquiring required inputs and increasing their funding.

The study also revealed that only a minority of the farmers had proper training in agricultural practice with majority of them having attended only short courses. The second recommendation is that for the country to achieve the stated aspiration as contained in Kenya's Vision 2030, there should be concerted effort to equip the farmers through training on appropriate farming practices. The ministry should provide the facilitation and resources required to enlighten and support farmers in their farming initiatives. Qualified personnel on farming practices of fresh fruits and vegetable should be availed to enhance commercial farmers' initiatives. The government should provide practical demonstration by setting up demonstration units in its own farms and also support the fresh fruits and vegetable farmers in its irrigation schemes across the country.

Suggestions for Further Research

This study established that farmer characteristics influenced the performance of commercial farmers. The study focused only on fresh fruits and vegetables among all other agricultural products offered to the market in their fresh unprocessed form. This limits the generalization of the study to only a small section of the agricultural sector. To expand the scope of the study, future research should cover other fresh agricultural products. The study consisted of an independent and dependent variable. Each of the variables had a specified number of constructs. The variables and constructs were not exhaustive and it is possible to extend the number of variables and constructs such as marketing knowledge and training under farmer characteristics to expand the study's scope and level of generalization.

The study population was limited to Kiambu County which has unique characteristics that favour commercialization of fresh fruits and vegetables. While the findings of the study provide useful insight into the interrelationships among the study variables, the unique characteristics of the County may limit the extent of generalization to other counties. This calls for an extension of the study to other counties with differing social economic and climatic conditions to confirm the hypothesized relationships in the current study.

This study focused on the relationship between farmer characteristics and performance of commercial farmers. The arising interactions resulted in statistically significant relationships among most of the study variables. More studies should be conducted to establish what such factors like marketing practice and operating environment would have on performance of commercial farmers. A study designed with farmer characteristics as the independent variable and marketing practices and operating environment as moderating variables would lead to different interactions and different levels of relationships. Such a study would also add to the current level of knowledge in this subject matter.

The current study adopted a descriptive cross sectional survey design and relied on data provided by the respondents to evaluate the contribution of different variables to performance of commercial farmers. A study should be designed to correct collaborative secondary data to confirm the self reported data provided by the respondents. This would reduce subjectivity in the provided data and strengthen the reliability of study findings.

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