Access to Export Market for Mango Farmers in the Lower Manya District of Ghana

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Abstract
This study assessed accessibility to export market for mango farmers in the Lower Manya district of Ghana. It looked at the marketing outlets used, the major buyers, farmer ability to meet buyer requirements and the effect of farm and operational factors on ability of farmers to access or participate in export markets. Data for the study was collected using structured questionnaire covering the operational activities during the 2013/20014 farming year. The data was analysed using simple descriptive statistics, involving means and frequencies; t-testing and regression using the SPSS version 16. It was observed that 99% of the farmers used multiple marketing outlets to sell their mangoes. Many farmers sold their produce from the farm gate than through the other outlets, whiles more produce was sold through central markets than through the other outlets. Retailers bought mangoes from more farmers than the other categories of buyers, whiles exporters bought more volumes than the other buyers. A greater proportion of the mangoes (62%) were sold locally although about 64% of the farmers have access to export market. Volume was the most important and the most difficult buyer requirement to meet. The number of outlets where mangoes are sold, and the number buyer categories to whom mangoes are sold to, have significant effect on access and participation in export market.
Keywords: Mango, market access, participation, marketing outlets, export market, buyer requirements

1. Introduction

Mango (Mangifera indica) is a tropical evergreen (deciduous) tree, of Asian origin cultivated for its edible fruit. They vary in size and shape from round to oval, flat to full and symmetrical to asymmetrical. Their skin colour varies from green to yellow, with blushes of red or reddish purple. Flesh colour ranges from a light yellow to vivid orange (Saave 2011).

Mango is one of the most consumed fresh fruits in the world, constituting about 50% of all tropical fruits produced worldwide (Jedele et al., 2003). It is a fruit crop with one of the widest range of varieties which include: Julie, Palmer, Edward, Saigon, Keith, Haden, Peter, Dabsha, Hindi, Mummy, Tommy, Van Dyke, Benishan, Kesar and Lick (Saave 2011). The largest share of mango production is traded and consumed fresh (Van Melle and Buschmann 2013, Saave 2011) with the processing industry using only !% (Calatrava-Requena, 20014). Global production of the fruit has increased in recent years; increasing from 34.9 million tons in 2009 to 43.9 million tons in 2013. Production in Ghana also increased from 75 thousand ton to 95.5 thousand tons over the same period (FAOSTAT 2017, propspectiva2020, 2015). Over ninety percent (90%) of mango production is grown by smallholder farmers (Van Melle and Buschmann 2013).

Market access implies participation in a commodity value chain (Al-Hassan 2014). It is a recognised way to improving agricultural production, food security, and economic development and poverty reduction (Al-Hassan 2014; Forstater, MacGillivray and Raynard 2006, IFAD 2003); hence linking smallholder famers to markets has become the focus of development policies; and the success depends on factors such as producer and product characteristics; consumers served, and available markets (Kürschner, et al., 2016; Van der Meer 2005). Farmer market access entails selling to buyers at the farm gate or at the market place (Sebatta, et al., 2014; Maziku, 2015). The markets farmers participate vary in size, location , and connectivity (UNCTAD, 2015; Arias, et al.,2013).

Ultimately, every producer hopes to access a strategic market niche where their produce can be sold continuously (Zakari, 2012); and often export markets in Europe and America are targeted because of their higher prices; but due to issues with high costs, risks, and low competitive advantage, it is more sustainable and profitable to engage in domestic or regional markets (Van Melle and Buschmann 2013). The negative impact of recent increase in demand for high value products especially fruits and vegetables on market (export market) accessibility as a result of related standards and certifications (Van der Meer 2005) requires that, market oriented production systems must focus on delivering products that meet buyer requirements (Faye 2007). It is therefore important especially for producers to be conscious of buyer requirements (CBI 2009); so as to respond to them adequately and also for participating in specific commodity value chains (Al-Hassan 2014).

According to Sefa-Dedeh (2005), in Ghana a high proportion of produce originally destined for the export market finds their way into the local markets. On mangoes, Zakari (2012) asserted that about 80% of mangoes produced do not get exported. To provide a basis of claims and support towards gaining, maintaining or improving participation in commodity markets, regular knowledge of farmer market accessibility is important. This study was conducted with the aim of knowing: the marketing outlets mango farmers use in selling their

produce; the major buyers of produce from the farmers; ability of farmers to meet buyer requirements; and the effect of farm and operational factors on likelihood to participate in export market.

2. Methodology
2.1. Study area and data collection methods
Ghana has three main production zones for mangoes: the southern zone (Greater Accra, Volta and Eastern regions), the middle zone (Brong Ahafo and Ashanti region) and the Northern Zone (Northern region) (Zakari 2012). This study was focused on mango farmers in the Lower Manya district of the Eastern region in the Southern zone. Data for the study was obtained through a random survey of one hundred (100) exotic mango farmers within the district using a structured questionnaire. Farmer willingness to partake in the survey was obtained after explaining the purpose of the study to them. Information obtained included farm location, farm size, mango variety cultivated, main marketing outlets used for selling mangoes, main buyers, and the requirements of main buyers. The details were with reference to the 2013/2014 production year.

2.2. Data analyses methods
Responses from the survey was analysed using descriptive statistics, multiple response sets, comparison of means with one sample t-testing, and binary logistic regression using SPSS V 16.
- **Marketing outlets**

Marketing outlets was aimed at determining the main marketing outlets (points) where farmers sell their produce (mangoes) and the proportions of produce sold at the outlets. Predefined outlets, which define the general outlets in the area for marketing agricultural produce, were listed for farmers to indicate the proportions of produce sold through these outlets. The outlets include:

Farm-gate: refers to the sale of produce to buyers at the farmstead. At farm gates, the produce is normally sold to people to buyers soon after harvest usually in larger quantities. Farmers prefer farmgate market because they are saved from the cost of transporting produce to a marketing centre.

Local assembly markets: refers to sale of produce at markets located within production communities. These markets are smaller and are organised under huts and sheds. They are usually patronised by aggregators who move from one market to another and buying the produce in smaller quantities, assembling them and transporting them to bigger towns or cities for resale.

Highway markets: this is an emerging and fast developing outlet for the sale of agricultural produce especially fruits and vegetables in Ghana. Produce for sales are displayed under sheds at joints along highways, usually targeting travellers. Their growing popularity of this market outlet results from their convenience and the freshness of the produce sold. Some of such sales joints are fast growing bigger and produce are even being sold in commercial quantities.

Central markets: These are usually wholesale markets within cities or big towns. Produce are transported from different production communities in large volumes for sale. These markets are patronised by different buyers and are the main markets for bulk buyers for resale.

Export market: Entails farmer exporting produce directly or through an exporter. This may be through personal or group arrangements, where the produce is delivered to a designated place.

The responses were analysed by multiple response cross tabulation for outlets, frequency for number of outlets used, and by descriptive statistics for proportion of produce sold through the outlets.
- **Main buyers**

For major buyers of produce from the farmers in terms of volume, respondents were required to confirm defined categories of buyers that bought produce from them during the period and to indicate the proportion of total sales that were bought by the categories of buyers. The buyer categories entailed: consumers, retailers, wholesalers, processors, exporters. The 'exporter buyer' is distinct from the 'export market' such that the 'market' entails only farmer own export arrangement whereas the 'buyer' entails own arrangement in addition to other purchases believed to be meant for export. Multiple response analyses was done for buyer categories buying produce (produce sold to); frequency distribution and histogram for number of buyer categories buying produce (produce were sold to); and by descriptive statistics for proportion of produce bought by (sold to) the categories of buyers.
- *Buyer requirements*

The aim of this section is to assess the difficulty for farmers in meeting the requirements of buyers. Farmers were requested to identify their important category of buyers ("important buyers") among consumers, retailers, wholesalers, processors and exporters, based on value of trading and other relationship and not on value or volume of sales. They were also required to confirm the relevance of five predetermined factors to their "important buyers" by indicating "yes" or "no". The factors include: regularly supply of produce, supply volumes; physical quality of produce such as size, shape, and ripeness etc; chemical (nutritional) quality of produce, and evidence of certification of operations. Further, on the basis of a five point likert scale [very difficult (1), difficult (2), manageable (3), easy (4), and very easy (5)], the farmers indicated how easy it is meet

these buyer requirements. The buyer requirements was analysed by multiple response cross tabulation between important buyers categories and requirements, whiles capacity to meet buyer requirements was analysed by a one-sample t-test using a test value of 3 (manageable). The null hypothesis of the t-test was that: there was no significant difference between mean responses and test value – 3.

▪ **Export market accessibility**

The impact of farm and operational factors on likelihood of the farmers to access export market was assessed at two levels: access to export market (i) via export market outlet and (ii) via exporter buyer. The probability of selling through "export market outlet" was classified as "export market accessibility" and as a dependent variable, and regressed against: farm size (ha), membership to farmer organisation, mean ability to meet buyer requirements, and number of outlets where mangoes were sold; as independent variables using the binary logistic regression model, expressed as:

$$\Pr(Outlet = 1|X) = F(\beta_0 + \beta_1 ha + \beta_2 assoc. + \beta_3 require + \beta_4 N.Outlets) = F(Z_a), \text{ whiles}$$

$$F(Z_a) = \frac{1}{1 + e^{(\beta_0 + \beta_1 ha + \beta_2 assoc. + \beta_3 require + \beta_4 N.Outlets)}}$$

Similarly, the probability of selling through an "exporter buyer" was classified as "export market accessibility" and was treated as a dependent variable which was regressed against: farm size (ha), membership to farmers' organisation, mean ability to meet buyer requirements, and number of buyer categories that mangoes were sold, as independent variables, using the binary logistic regression model, expressed as:

$$\Pr(Buyers = 1|X) = F(\beta_0 + \beta_1 ha + \beta_2 assoc. + \beta_3 require + \beta_4 N.Buyers) = F(Z_b) \text{ Whiles}$$

$$F(Z_b) = \frac{1}{1 + e^{(\beta_0 + \beta_1 ha + \beta_2 assoc. + \beta_3 require + \beta_4 N.Buyers)}}$$

3. RESULTS AND DISCUSSION

3.1. Respondent and farm characteristics

All the 100 respondents were males. The bias is partly socio-cultural, because in most agro-production sub-sectors, especially with tree crops like mango, cocoa, oil palm amongst others, cultivation is seen as activity for men while women or engage in processing and marketing. The ages of the respondents were between 33 and 65years and an average of about 50years, and their mango farming experience also ranged between 1 and 25years and 10years average

Table 1: **Descriptive Statistics on respondent and variety cultivation**

Descriptive Statistics

		N	Minimum	Maximum	Mean	S.D	C.V (%)
Gender (male=1, female=0)		100	1.00	1.00	1.0000	.00000	0.0
Respondent age (years)		100	33.00	65.00	49.7600	8.06178	16.2
Mango farming experience (years)		100	1.00	25.00	9.8600	4.48571	45.5
Farm size (ha)		100	1.60	8.00	3.7680	1.56237	47.1
Variety & farm size (ha)	Kent	53	1.60	8.00	3.9019	1.65093	42.3
	Keith	37	1.60	7.20	3.7730	1.55074	41.1
	Haden	10	1.60	4.00	3.0400	.88844	29.2

Source: Author compilation from survey data on respondents, and variety and acreage cultivated.

The farm sizes ranged from 1.6ha to 8ha and an average of 3.768ha. Up to 70% of the farms were up to 4ha. This is in line with indication by Van Melle and Buschmann (2013) that about ninety percent (90%) of mango production is grown by smallholder farmers. The varieties of mango cultivated were kent (53%), keith (37%), and haden (10%) (See table 1).

3.2. Main marketing outlets for fresh mangoes for farmers

The multiple response set indicates that farmgate was the most commonly patronised outlet for selling the produce (confirmed by 71% of farmers), which was closely followed by central market outlet (69% of farmers). Participation in farmgate is high and it offers the advantage of alleviating the responsibility and cost of transporting produce to other marketing outlets. The results show good participation in the export outlet (46% of farmers). This confirms the suggestion by Narrod et al. (2009) that, given institutional support small holder farmers are able to maintain presence in high value export market. What is of essence now is the nature of support available to smallholder farmers to encourage participation in export (see table2).

Table 2: **Multiples response on participation in marketing outlets (where produce were sold)**

Outlet Frequencies

		Responses		Percent of Cases
		N	Percent	
market outlets[a]	farm gate sales	71	25.9%	71.0%
	local community market	64	23.4%	64.0%
	street market	24	8.8%	24.0%
	central market	69	25.2%	69.0%
	export market	46	16.8%	46.0%
Total		274	100.0%	274.0%

a. Dichotomy group tabulated at value 1.

Source: author from survey data on where produce was sold

Based on the proportion of produce sold through outlets, the main marketing outlet for the farmers was central markets (30.4% of produce sold) and the least important outlet was highway roadside market (6.7% of produce sold). Generally, central markets are the most important outlet for marketing agricultural commodities in Ghana. The highway marketing outlet, although being new and an emerging market especially for farmers, and small in terms of proportion of sales, it served as the main market outlets to some farmers, contributing up to 70% maximum sales (See figure 1)
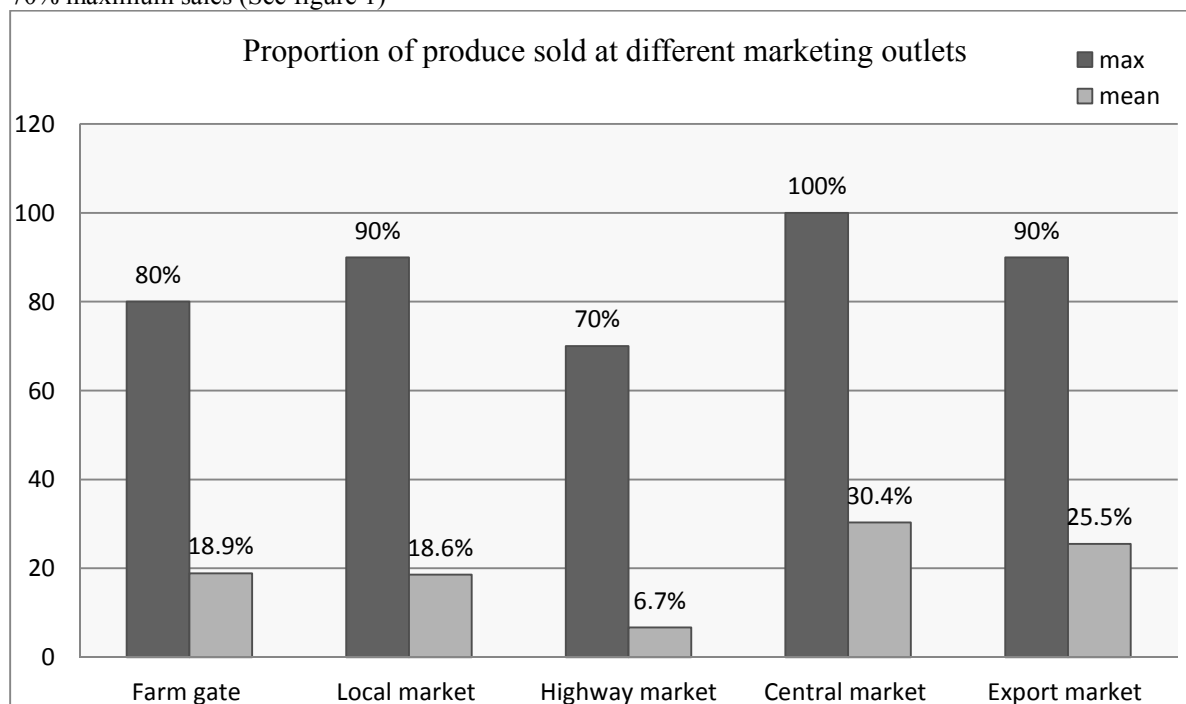

Figure 1: Proportion of produce sold at different marketing outlets
Source: author from survey data on proportion of mangoes sold through marketing outlets (2013/2014)

3.3. Main buyers of fresh mangoes from farmers

The results in table 3 from multiple response sets suggest that retailers and exporters respectively were the most common buyers from the farmers – they bought from 65% and 64% of the farmers respectively. Also, 54% of the farmers sold directly to consumers, 52% to processors and 36% sold to wholesalers. In all, 95% of the farmers sold mangoes to more than one buyer category; 32% sold to two categories whilst 51% sold to three categories mainly (see figure 2).

Figure 3 shows that exporters were the highest buyers (38%). This proportion is higher compared to the suggestion by Zakari (2012) that only 20% of mangoes get exported. This could mean an improvement in exported mangoes with time or a higher proportion from the zone. Also, although consumers bought least proportion, they in some instances constituted major buyers, buying up to 50% of total sales (see figure 3 for max proportion of mangoes bought by categories of buyers).

Table 3: **Category of buyers whom produce was sold to**

Buyers Frequencies

		Responses		Percent of Cases
		N	Percent	
Buyers[a]	Consumers	54	19.9%	54.0%
	Retailers	65	24.0%	65.0%
	Wholesalers	36	13.3%	36.0%
	Processors	52	19.2%	52.0%
	Exporters	64	23.6%	64.0%
Total		271	100.0%	271.0%

a. Dichotomy group tabulated at value 1.

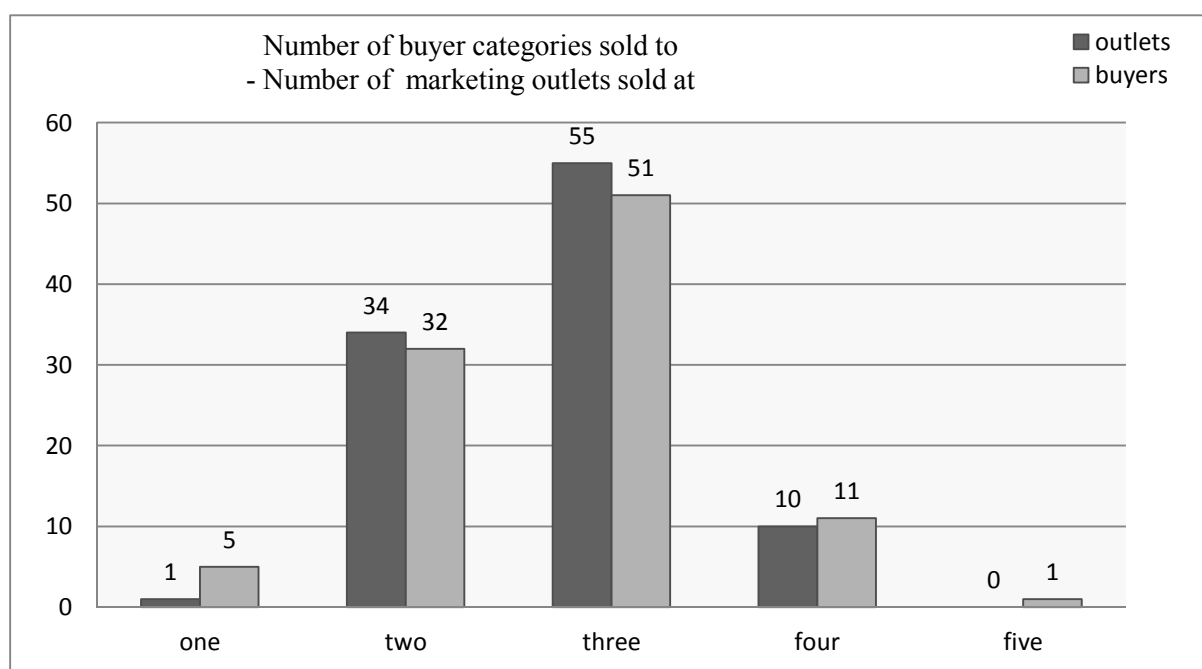Source: author from survey data on buyer category mangoes were sold to (2013/2014)

Figure 2: Number of categories of outlets sold at and number of categories of buyers sold to
Source: author from survey data number of categories of outlets/buyers sold at/sold to

The proportion of produce bought by exporters is about two times more to the proportion bought by retailers, although the level of interaction with farmers (category of buyers farmers sold to) is almost same. The proportion bought by consumers is low because naturally consumers buy from retailers except in few instances where farmers decide to retail themselves.
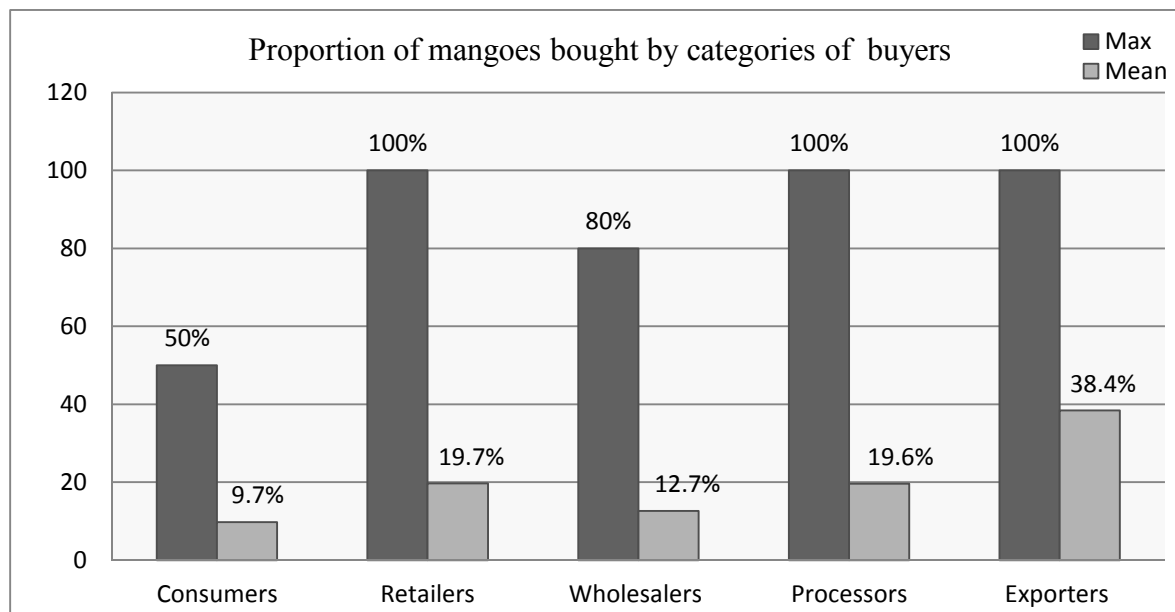
Figure 3: Proportion of mangoes bought by different categories of buyers

Source: author from survey data on fresh mangoes sales to buyer categories (2013/14 season)

3.4. Capacity to meet buyer requirements

Faye (2007) advised that, to ensure market access, market oriented production systems must focus on delivering products that meet buyer requirements. In assessing capacity to meet buyer requirements, buyer requirements of major/main buyer category were first determined. From table 4, Volume was confirmed by 84 (84.4%) of the farmers as most important requirement of buyers whilst certification appeared as the least important buyer requirement (21/21.1%). This could probably be due to a greater proportion of the produce are sold locally where certifications are not strictly assessed. Regular supply and physical qualities of produce was equally confirmed by 69 (72.6%) of the respondents.

Table 4: Requirements of important category of buyers

Buyers *buyer requirements Cross tabulation

Buyers	Freq	Requirements for important buyer[a]					Total
		Supply volumes	Supply regularity	Physical qualities	Chemical qualities	Certification	
Consumers	Count	12	11	11	2	0	12
	% of Total	12.6%	11.6%	11.6%	2.1%	.0%	12.6%
Retailers	Count	23	16	16	6	3	25
	% of Total	24.2%	16.8%	16.8%	6.3%	3.2%	26.3%
Wholesalers	Count	31	27	27	11	9	34
	% of Total	32.6%	28.4%	28.4%	11.6%	9.5%	35.8%
Exporters	Count	18	15	15	10	9	24
	% of Total	18.9%	15.8%	15.8%	10.5%	9.5%	25.3%
Total	Count	84	69	69	29	21	95
	% of Total	88.4%	72.6%	72.6%	30.5%	22.1%	100.0%

Percentages and totals are based on respondents.

a. Dichotomy group tabulated at value 1.

Source: author from survey data on important buyers' requirements of fresh mangoes (2013/14 season)

On the ability to meet buyer requirements, supply volume and regular supply with the mean differences of -1.2 and -.66 were difficult to meet whiles chemical qualities and certification with mean differences of .33 and .67 were easy to meet. Meeting supply volume was the most difficult requirement to satisfy, but satisfying certification requirement easier. The null hypothesis on supply volume and regular supply were strongly rejected,

but that on chemical and nutritional requirements were strongly accepted (See table 5 for details of analysis).

Table 5: **One sample t-test on farmer capacity to meet buyer requirements**

One-Sample Statistics

	N	Mean	Std. Deviation	C.V (%)
Supply volume	100	1.8000	.42640	10.5
Regular supply	100	2.3400	1.12115	92.9
Physical qualities	100	3.1700	1.01559	32.0
Chemical qualities	100	3.3300	.93263	28.0
Certification	100	3.6700	.92174	25.1

One-Sample Test

	Test Value = 3						Meaning	Null Hypothesis decision
	t	Df	Sig. (2-tailed)	Mean Difference	95% Conf. Interval			
					Lower	Upper		
Supply volume	-28.142	99	.000	-1.20000	-1.2846	-1.1154	Difficult	Strongly Rejected
Regular supply	-5.887	99	.000	-.66000	-.8825	-.4375	Difficult	Strongly Rejected
Physical qualities	1.674	99	.097	.17000	-.0315	.3715	Manageable	Accepted
Chemical qualities	3.538	99	.001	.33000	.1449	.5151	Easy	Strongly accepted
Certification	7.269	99	.000	.67000	.4871	.8529	Easy	Strongly Accepted

Source: author from survey data on farmer capacity to meet buyer requirements (2013/14 season)

3.5. Export market accessibility

The diagnoses were done through log likelihood and wald statistics. The parameter estimates for the model was evaluated at 5% level of significance. The binary logit estimates in table 6 shows that the "likelihood to access export market" was positively related to farm size, membership to farmer organisation, and number of outlets where mangoes are sold, but negatively related to ability to meet requirements. The effects of farm size and membership to farmer organisation were not significant, but the effect of ability to meet buyer requirement, and of number of outlets were significant and very significant respectively. The odds were 1.096 for farm size; 1.030 for membership to farmer organisation; odds: 5.004 for number of outlets, and 0.175 for those who are more able to meet buyer requirements. The number of outlets type traded showed the highest effect on export market accessibility.

Table 6: **Binary logistic estimates on likelihood access to export market via export market outlets**

Classification Table[a]

			Predicted		
			Export market outlet		
	Observed		0	1	Percentage Correct
Step 1	Export market outlet	0	41	13	75.9
		1	16	30	65.2
	Overall Percentage				71.0

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Size(ha)	.091	.151	.365	1	.545	1.096
	Association	.030	.523	.003	1	.955	1.030
	Require	-1.742	.714	5.961	1	.015	.175
	N.Outlets	1.610	.423	14.486	1	.000	5.004
	Constant	.017	2.303	.000	1	.994	1.017

Classification Table[a]

	Observed		Predicted		
			Export market outlet		
			0	1	Percentage Correct
Step 1	Export market outlet	0	41	13	75.9
		1	16	30	65.2
	Overall Percentage				71.0

a. Variable(s) entered on step 1: farm size (ha), Association, Require, N.Outlets.

Similarly, the binary logit estimates of the analysis on "likelihood to access exporter buyer" in table 7 showed "export market accessibility" is positively related to farm size, membership to farmers organisation, and number of buyer categories; but negatively related to ability to meet buyer requirements. The effects of all the variables were none significant except that of number of buyer categories selling to. The odds were 1.058 for farm size, 1.474 for membership to farmer organization, 3.640 for number of buyer categories, and 0.548 for ability to meet buyer requirements. The results show that the number of buyer categories sold to has the highest effect on export market accessibility.

Table7: Binary logistic estimates on likelihood access to export market via exporter buyers

Classification Table[a]

	Observed		Predicted		
			Sold to exporter		
			0	1	Percentage Correct
Step 1	Sold to exporter	0	18	18	50.0
		1	12	52	81.2
	Overall Percentage				70.0

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Size(ha)	.056	.161	.123	1	.726	1.058
	Association	.388	.519	.560	1	.454	1.474
	Require	-.601	.668	.811	1	.368	.548
	N.Buyers	1.292	.356	13.174	1	.000	3.640
	Constant	-1.569	2.252	.485	1	.486	.208

a. Variable(s) entered on step 1: size (ha), Association, Require N.Buyers

3.6. SUMMARY AND CONCLUSIONS

It was realised that kent, Keith and Haden were the main varieties cultivated in the area and kent was the dominant variety. Almost all the farmers use multiple marketing outlet types in selling off produce. The multiple outlets help in expanding the market base and for selling different grades of mangoes to different buyer categories. Majority of the farmers (89%) used between two (2) and three (3) types of outlets. The most common outlet types used were farmgate and central markets; however, higher proportion of all produce sold (30%) was sold through central market outlets. About 64% of the farmers have access to export market through exporter buyers, and about 38% of all the mangoes are sold were exported. The export of a little above a third of the mangoes sold confirms the suggestion by Sefa-Dedeh (2005), and Zakari (2012) that majority of the mangoes produced are sold locally. What is not certain about the low export proportion is whether it is caused by increasing local demand or lower export market accessibility. Supply volume was the most important buyer requirement as well as the most difficult to satisfy; suggesting a demand gap not adequately met. Certification was the least important requirement and the least difficult to meet; which probably could be because majority of the mangoes are sold locally and local buyers are not critical of certification hence farmers have no problem meeting that requirement. The number of buyer categories and the number of outlet types have higher effects on export market accessibility and participation

It is thus concluded that that mango farmers use multiple outlets in selling of their production. The most farmgate is the most used outlet by farmers for mango sales whilst central market outlet is where most mangoes are sold. Retailers are the most common buyers and exporters are the main buyers. Volume is the most important requirement of buyers and the most difficult to meat by farmers. The number of outlet categories where mangoes are sold and the number of buyer categories that mangoes are sold to are the main factors most significant farm and operational factor that influence export market accessibility or participation.

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