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Satisfaction Rating of Coordination Mechanisms by Dairy Producers around Community Milk Cooling Plants in Western Kenya

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Abstract
A number of studies have used value chains approach to look at critical constraints that limit the growth of milk production and marketing. However, existing literature is limited on case studies that have first considered establishing the satisfaction levels of support services provision to individual producer households so as to inform accurate constraints identification for sustainable policy and technical intervention. This study undertook to identify and analyze coordination mechanisms that had been developed to support producer households around community milk cooling plants using factor analysis approach. Primary data from 273 households selected through simple random sampling method was collected using a semi structured interview schedule. From the results, the overall satisfaction mean score rating was 5.4 with feeds provision and clinical services had the highest satisfaction mean scores respectively. From factor analysis, three factors were generated, and were named as support for training, support for inputs and support for marketing respectively. Cronbach's α test results confirmed reliability for support for input and training factors. It was concluded that though efforts had been made to provide support services to producers, service provision was inefficient and uptake still low in some services. It is recommended that in order to enhance the proportion of milk that entered the community milk cooling plants, pricing policies based on grade of milk should be put in place so as to attract more producers to join and supply regularly to the cooling plant at premium prices and also to make the producers benefit from the services being offered
Key words: Community Milk Cooling Plant**,** Factor Analysis, Producers, Support Services

1. Introduction

Dairying is a development tool that widens and sustains major pathways for households out of poverty by securing assets of the poor, improving smallholder productivity and increasing market participation by the poor. The dairy industry in Kenya, contributes 3.5 percent of the total Gross Domestic Product (GDP) (Government of Kenya [GOK, 2008]). It also plays an important economic and nutritional role in the lives of many people. The industry statistics by the (Kenya Dairy Board [KDB], 2012) estimated the national annual milk production in 2012 to be 3.73 billion litres. Unlike the dairy producers in developed countries like United States and the European Union, dairy producers in most sub-Saharan Africa countries face a number of constraints in their production and marketing which leads to supply side inefficiencies. Despite the dairy sector contribution to the GDP in Kenya, Mutura, Nyairo, Mwangi and Wambugu (2015) noted that milk production, processing and marketing was limited by several factors. Production was limited by inadequate quantity and quality of feed, lack of good quality animal husbandry, poor access to breeding, animal health and credit services and also poor infrastructure hence reducing the incentives to increase milk production. Milk marketing on the other hand was limited by infrastructure bottlenecks caused by poor road networks and lack of appropriate cooling and storage facilities. During the period 2012 – 2016, Kenya introduced a programme called Kenya Market-Led Dairy Programme (KMDP) which was funded by the Netherlands and implemented by SNV (Stichting Nederlandse Vrjwilligers-Meaning Netherlands Development Organization) in Collaboration with the Kenyan stakeholders in the dairy industry. The KMDP interventions triggered changes through processors as well as Collection and Bulking Enterprises (CBEs). Their investments significantly contributed to the expansion of the number of services offered such as provision of artificial insemination (A.I), extension services, clinical services, milk marketing among others to smallholders. According to SNV (2013), the milk uptake of these processors subsequently increased with the establishment and equipping of milk cooling plants. Similar efforts were undertaken by the Western Kenya Community Driven Development and Flood Mitigation Project (WKCDDFMP) between 2008-2016 through joint funding by the World-Bank and the government of Kenya. During this period, several community milk cooling plants were constructed and equipped in western Kenya counties providing services to dairy farmers to increase milk production for their personal consumption and marketing. This study, undertook to identify and analyze coordination mechanisms that had been developed to enhance farmers' milk production and marketing around community milk cooling plants by rating producers' satisfaction with a large set of preset variables or coordination mechanism and using factor analysis approach that establishes few unobserved factors from the large set of preset variables observed

2. Literature Review

Coordination mechanisms in this study refers to support services offered by stakeholders to the producers to ensure that there is improved milk production and efficient marketing. According to Dorward, Kidd, Morrison and Poulton (2005) economic coordination is designed to make players within a market system act in a complementary way towards a common goal. Vannopen (2003) urgues that lack of economic coordination posses serious risks to those involved in the rural economy. Lemma, Singh, and Kaur (2015) observed that coordination is something that every firm needs for managing interdependent logistic activities in order to mitigate demand variability. Siyapalan and Kajananthan (2012) used value chains approach to look at critical constraints that limited the growth of milk production and marketing and found that at least each value chain actor had some constraint. Anh, Coung and Nga (2013) also did a study in Vietnam, Latin America based on value chain approach and found that millions of rural farmer households were struggling against inefficient production and marketing due to a number of constraints depending on the scale of production. They picked what producers cited as constraints such as high input prices, scarcity of inputs and low farm gate prices directly without considering the rating of level of service interventions provided. Siyapalan and Kajananthan, (2012) identified key players in the value chain to include the input suppliers, farmers, milk collection centres, processors and retail outlets. To strengthen the capacity of the small holder dairy farmers, Bammann (2007) in his study on 'Participatory value chain analysis for improved farmer incomes, employment opportunities and food security' recommended that promoting organizations should have field level hands on support and training to smallholder farmers and maintain close monitoring through farm visits. In India, Pakistan and China, cooperatives have been observed to provide these services.

It will be noted that all the above studies used value chains approach to look at critical constraints that limited the growth of milk production and marketing. From the available literature, no documented study has engaged producers in rating support services received towards mitigation of constraints specifically before looking at the constraints they faced. Where satisfaction status of support services provided is confirmed at individual producer level, the constraints identified thereafter will be accurate and will lead to sustainable policy and technical solutions. This paper used likert sclale in rating coordination mechanisms and thereafter factor analysis as a unique statistical approach of establishing few unobserved factors based on a large set of observed variables.

3. Data collection and Methodology

3.1Data Collection and sampling precedures

The areas of study comprised of two counties of Bungoma and Kakamega in Western Kenya where the Western Kenya Community Driven Development and Flood Mitigation Project (WKCDDFMP) activities were implemented. According to the 2009 census report, Kakamega County had a population of 1,660,651, an area of 3033.8Km^2 and 49% poverty level (GOK, 2014). Bungoma County had a population of 1,375,063 people, an area of 2,069Km^2 and 47% poverty level. The economy in both counties was mainly driven by agriculture through crop and livestock production.

A three stage sampling technique was used whereby the western region was divided into five counties. Then two counties of Kakamega and Bungoma were randomly selected each with 5 and 4 functional community milk cooling plants respectively. Two cooling plants were selected in each county using simple random sampling. Around each community milk cooling plant and with the help of key informants, a list of dairy producers was constituted. Through interviews, data was collected between April and May of 2016 from dairy producers in the two counties.

To determine the sample size in each area around the community milk cooling plant, the formula: $n = K^2R(1-R)/D^2$ as given by Kothari (2004) was used.
Where:
n = sample size
R = Proportion of the population containing the major attribute (Dairy cow producers)
D = Margin of error in percentage.(D=0.1)
K = Confidence level of 95% (Z-value=1.96)
Without the prior knowledge of the proportion of dairy cow producers, R= 0.5,This gave sample sizes of 96 for each county. The sample size of 96 was increased to 136 for purposes of taking care of non-responses. Around each milk cooling plant, 68 households were selected by simple random sampling technique giving a total of 273 respondents.
Data that was collected included quantity of milk produced and marketed, rating on the value of various input and services provided by service providers. From milk cooling plants, data related to services offered to producers were collected. A semi structured checklist for producer households and community milk cooling plants management were developed to obtain information of interest from each category.

3.2 Statistical Analysis

Factor analysis method was used to identify few broad non observable factors from the wide range of services offered by service providers to the dairy farmers around the community milk cooling plants as a form of market coordination. This method investigates whether a number of variables of interest $Y_1, Y_2, \ldots\ldots Y_i$, are linearly related to a smaller number of unobservable (underlying) factors $F_1, F_2\ldots\ldots\ldots, F_k$ (An & Pearce, 2013).
The four steps followed in factor analysis included firstly, computation of the correlation matrix using Bartlett's test of sphericity so as to determine if factor analysis was appropriate for use in analysis. Secondly, extraction of the factors using principal components analysis method, thirdly factor rotation done using varimax rotation method which encourages the detection of factors each of which is related to few variables and discourages the detection of factors influencing all variables. Finally calculation of factor scores using Bartlett's approach which indicates how each "hidden" factor is associated with the "observable" variables used in the analysis.

3.2.1 Variable Definition

The null hypothesis was that the determinant of the correlation matrix of the observable variables is unity. In order to validate the above hypothesis the following variables were constructed.
Latent variables ($F_1, F_2, \ldots F_k$): Were non observable variables identified in terms of number and named based on the category of observable variables loading heavily onto each.
Observable Variables: The rating scores of various services prevailing by producers on a likert scale where value of 1represented lowest satisfaction and value of 10 represented highest satisfaction. The independent variables used in this study were described in table 1as follows:

Table 1: Variables for Factor Analysis

Variable	Description
Rating on satisfaction level of dairy cow donations	A continuous variable that took a value of between 1-10 depending on the producers' own rating on the level of dairy cows donations to the producers.
Rating on satisfaction level of A.I services	A continuous variable that took a score value of between 1-10 depending on the producers' own rating on the level of artificial Insemination services provision.
Rating on satisfaction level of dairy feeds provision	A continuous variable that took a score value of between 1-10 depending on the producers own rating on the level dairy feeds provision.
Rating on satisfaction level of price margin gains	A continuous variable that took a value of between 1-10 depending on the producers' own rating on the value of price gains as a result of price offered by a channel of choice compared to other channels.
Rating on satisfaction level of transport services used	A continuous variable that took a value of between 1-10 depending on the producers own rating on the benefits or level of savings on transport gained arising from transport arrangements in use.
Rating on the satisfaction level of dairy related trainings provision	A continuous variable that took a score value of between 1-10 depending on the producers' own rating on the level of dairy related training sessions provision.
Rating on the satisfaction level of extension visits provision	A continuous variable that took a score value of between 1-10 depending on the producers' own rating on the level of extension visits provision
Rating on the satisfaction level of clinical services provision	A continuous variable that took a score value of between1-10 depending on the producers' own rating on the value of clinical services provision.
Rating on the satisfaction level of exchange tours provided	A continuous variable that took a score value of between 1-10 depending on the producers' own rating on the level of tours provided by a service providers
Rating on the satisfaction level of milk sales promotional strategies used	A continuous variable that took a score value of between 1-10 depending on the producers'own rating on the level of promotional efforts in form of advertisements as a milk marketing strategy.

It was assumed that each Y variable is linearly related to the factors, as per equation 1:

$Y_i = \beta_0 + \beta_1 F_1 + \beta_2 F_2 + e_i$ (1)

Where:
Y_i is observed or manifest variable.
β_i is the "loading" for Y_j (Parameters of the linear factors).
F is latent (unobserved or underlying) variable.
e_j is measurement error for Y_j
The common factor can be expressed as a linear combination of the observed variables as per equation 2.

$F_i = W_{i1}q_1 + W_{i2}q_2 + \ldots + W_{ik}q_k$ (2)

Where:
F_i is estimates of i^{th} factor
W_i is the weight or factor score coefficient
q_i is the variable loading of each factor

4 RESULTS

a. Descriptives

4.1.1 Services and Proportion of Producers Served

Table 2: Proportion of Households receiving various services

Service/Variable	Percentage of Households
Artificial Insemination	68.5
Dairy cow donation	58.2
Dairy management training	78.8
Extension visits	57.5
Clinical services	74.8
Tours to other dairy farms	50.8
Dairy feeds provision	52.7
Community plant Transport services	26.7

Services actually provided were picked for this table. The proportions of households who had received various services in the last three years from the data collected was computed and outlined in table 2. The service received by most households was dairy management training while the service received least by households was transport services.

4.1.2 Services Providers Identified AcrossThe Community Cooling Plants

Table 3: **Service Providers Across Community Milk Cooling Plants**

Cooling Plant	Services							
	Transport	**Dairycow provision**	**Artificial Insemination**	**Dairy feeds provision**	**Training**	**Extension**	**Clinical**	**Tours**
Khwisero	Cooling Plant. Farmer	Cooling plant. Rural outreach programme	County government. Private vets. Cooling plant	Cooling plant. Agrovet	Cooling plant. Heifer International. Anglican development Services. County Government. Send a cow project.	Private vet. County Livestock department	Private vet. County Veterinary department	Heifer project International. Anglican Development Services. Send a cow project. County Livestock department
Kaptama	Cooling Plant. Farmer	Cooling Plant. County government	Cooling plant. Private vets	Agrovet	County Livestock department. Cooling plant. WARMA.	County Livestock department. WARMA	Private vet. County veterinary department. Herbalist	WARMA. Cooling plant
Naitiri	Cooling Plant. Farmer	Cooling Plant, County government	County government. Private vets. Cooling plant	cooling plant. Agrovets	Cooling plant. County Livestock department.	County Livestock department. Cooling plant	Private vet. County veterinary department. Cooling plant	Cooling plant.
Lukomu	Cooling Plant. Farmer	Cooling Plant. County government	County government. Private vets	Agrovet	Cooling plant. County Livestock department.	County Livestock department. Cooling plant	Private vet. County veterinary department. Cooling plant	Cooling plant. KAPAP. County Livestock department

Apart from milk transport services, and feeds provision the government department of livestock also took part in provision of other services and interventions including tours training, clinical services across the various cooling plants. The participation of non governmental agencies is dorminant in provision of training and tour services.

Table 4: Service Provision by Specific Service Providers

Services	Service Providers													
	Cooling Plant	Individual producer	WKCCD project	County government	Rural outreach program	Private veterinary	Agrovet	WARMA	Herbalist	HPI	Send a cow	ADS	VI Agroforestry	Totall
Transport services	72	197												269
Dairy cow provision			119	37	3									159
Artificial Insemination	52			35		100								187
Dairy feeds Provision	32						112							144
Training on dairy management	130			55	2			4		5	2	12	5	215
Clinical services	36			79		87			2					204
Extension services	36			63		56		3						158
Tours	74			3	3					11	24	14	6	135

Note: ADS: Anglican Development Services, WKCDD/FMP: Western Kenya Community Driven Development and Flood Mitigation Project, WARMA: Water Resources Management Authority, HPI : Heifer Project International

As reflected in table 4, 73% of producers utilized their own transport means to deliver milk to their customers while 27% who supplied to the respective cooling plants utilized transport arrangements put in place by the cooling plants. With respect to dairy cows provision, 75% of the producers received dairy cows from the western Kenya community development project while the rest got from the county government and other non governmental organizations. The private A.I practioners provided services to 53% of the producers while the cooling plants served only 28%..Though the cooling plants had started providing dairy feeds, they only served 23% producers while 77% were being served by the agrovets.

Training on dairy husbandry attracted a large number of on service providers. The cooling plants provided access to 60% of the producers followed by the county government which served 26%. For clinical services, most producers reported to have been served by private veterinary personnel as they are noted to respond quickly whenever called upon. Two milk cooling plants had started their own clinical services where producers could call the cooling plant management staff who then send a veterinary technician to go provide service. The herbalists were also observed to provide clinical services in one cooling plant located in Mt Elgon. This is explained by the observation that the cooling plant is located within the boundaries of the natural forest of Mt Elgon that is rich in medicinal plants for ethno veterinary use and forestry products.

The county government was observed to be a dominant provider of extension services serving about 40% of the producers. Private veterinary personnel also did provide extension by following-up on clinical cases they had previously handled. One cooling plant had advanced to the point of engaging its own extension service providers for purposes of ensuring increased milk production to sustain its operations. Tours for dairy producers attracted a large number of service providers many of whom were non-governmental and donor funded projects. The cooling plants through the western Kenya community project provided most of the opportunities of tours to producers as a way of preparing them to receive the dairy animals that were to be given later and also build their capacity and willingness to run milk cooling plants that were being established.

4.1.3. Satisfaction rating Scores

Table 5: Satisfaction Rating Score Frequencies and Mean Score

Service/Practice	Score range		Mean Score
	No of Score <5	No of Score >5	score
Training	0	215	6.9
Extension	0	115	6.5
Feeds provision	0	144	7.9
Clinical	0	204	7.0
Tours	70	69	4.2
Artificial Insemination	107	80	4.0
Dairy cows provision	69	90	4.7
Promotional strategies	157	116	3.9
Price margin setting	112	161	4.7
Transport	161	112	4.1

Based on the likert scale range of scores of 1-10, two score ranges of below 5 and a scale of above 5 were created to reflect below average satisfaction and above average satisfaction. Feeds provision had the highest satisfaction mean score, followed by clinical services. Promotional strategies had the least satisfaction mean score

4.2 Faactors Analysis Results

Table 6: Factor Rotation Output

Kaiser-Meyer-Olkin measure of sampling adequacy		0.6776
Bartlett's test sphericity	Approx. chi-square	365.161
	df	45
	sig	0.000

Variable	Factor 1	Factor 2	Factor 3	Uniqueness
A.I services	0.8474			0.2812
Extension Services		0.7233		0.4729
Transport services			0.7305	0.4581
Dairy cows	0.4904			0.7553
Training on dairy		0.6426		0.5769
Promotional strategy				0.9314
Dairy feeds	0.6943			0.4945
Price margins			0.7261	0.4619
Tours		0.7203		0.4723
Clinical services	0.7948			0.3642

LR test: Independent vs Saturated. Chi2 (45) =127.11, Prob> chi2=0.000,

Factor analysis results are as shown in table 6. Validity of variables was tested with Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity. The KMO value obtained was 0.6776 which was greater than 0.5. This indicated that data was appropriate for factor analysis. Bartlett's value was 365.161. This indicated that variables were not correlated at 99% confidence level. Hence the null hypothesis was rejected. Table 6 also shows factor loading (Correlation coefficients) obtained after varimax rotation for the factors on each variable. The closer the loadings to -1 or +1, the higher the correlation. In the output, the values which were not greater than 0.3 were omitted.

From the output, rating on level of tours, dairy training and extension visits were loading heavily on factor 1. The variables that loaded heavily on factor 2 were rating on level of AI serves, dairy feeds given and clinical services. Lastly, rating on level of promotional strategy, price margin and transport services were the 3 variables which loaded highly on factor 3. Factors 1, 2 and 3 were named as support for training, support for input and support for marketing respectively. The tables 7-9 show results of Cronbach's α Test or scale of reliability coefficient for each factor. The coefficient range of α is -∞ to 1 shows how well the test measures the respective support services. The more positive the number, the more the set of items being tested measure the latent factor. The rule of thumb was that this coefficient was to be at least 0.50 before a set of items is accepted as being related to a single latent factor.

Table 7: Support For Training Cronbach Test Output

Item	**Observations**	**Sign**	**Item-test correlation.**	**Item-rest Corrlation**	**Inter item correlation**	**Alpha**
Training	273	+	0.8042	0.5601	0.5895	0.7418
Extension visits	273	+	0.8398	0.6275	0.5010	0.6675
Tours	273	+	0.8412	0.6301	0.4976	0.6645
Test scale					0.5294	0.7714

Support for training factor in table 7 had a Cronbach's α test score of 0.7714 which was greater than 0.5 as recommended by (Nunnaly & Bernstein, 1994).

Table 8: Support For Input Supply Factor Cronbach Test Output

Item	**Obs**	**Sign**	**Item-test corr.**	**Item-rest Corr.**	**Inter item corr.**	**Alpha**
AI	273	+	0.8927	0.7884	0.4001	0.6668
Dairy cows	273	+	0.6590	0.4158	0.6472	0.8462
Feeds	273	+	0.7811	0.5981	0.5181	0.7633
Clinical services	273	+	0.8396	0.6946	0.4562	0.7157
Test scale					0.5054	0.8034

Support for input supply factor had a Cronbach's α test score of 0.8034 which was greater than 0.5 as shown in table 8.

Table 9: Support for Marketing Factor Cronbach Test Output

Item	**obs**	**sign**	**Item-test corr.**	**Item-rest Corr.**	**Inter item corr.**	**Alpha**
Transport services	273	+	0.7981	0.4738	0.0423	0.0812
Price margin	273	+	0.5121	0.0444	0.6458	0.7848
Promotion strategy	273	-	0.8000	0.4775	0.0383	0.0737
Test scale					0.2421	0.4894

Support for marketing factor as shown in table 9 had a Cronbach's α test score of 0.4894 which was less than 0.5

5. Discussion

5.1 Support For Training

As observed, support for training factor had a Cronbach's α test score of 0.7714 which was greater than 0.5. This meant that rating on level of extension visits, dairy training and tours indeed formed one latent factor of support for training. Extension visits help enhance producers' skills on animal health care, breeding, feeding and clean milk production. This ultimately creates a positive influence on milk marketing

according to a study in Ethiopian highlands by (Holloway & Ehui 2002). This position is supported by the study of Bahta, Sirak, Bauer and Siegfried (2007) who reported that extension visits significantly increased the probability that a small-scale farmer will sell his/her livestock products.

As far as dairy training is concerned, a report by FAO (2011) states that training should focus on animal health, milking hygiene, animal nutrition, animal welfare, environmental and socio economic management that will ensure safe quality of milk is produced using management practices that are sustainable from an animal welfare social economic, and environmental perspective. A study on training needs of dairy farmers in Nagpur district, India by Patil, Gawande and Nande (2009) revealed that health care and disease prevention, information on care and management of animals and breeding management were the top three rated training needs respectively.

In Malawi, the work of Kazanga (2012) on the impact of dairy management training of small scale dairy farmers indicates that training plays a crucial role in changing dairy famers' behavior towards good dairy management practices. This was because training had a positive impact on the behavioral change of small scale dairy farmers on availability of water, feed, cleaning of utensils, barn cleanliness and the resultant increase in milk yields and reduced milk rejection by buyers. This was also supported by Mutura et al (2015) who observed that farmers who had access to training were more likely to integrate in their dairy enterprise. Zinnah, Compton, and Adesina (1993) further emphasized that what is important was not the contact with training but how farmers assess the relevance of the issues discussed at such farmer workshops for their actual production decisions.

The contribution of tours to areas of good dairy practices is that it allows the visitors to see first-hand daily operations of safe milk production and the care dairy farmers give their land and animals. In addition, it helps producers learn how to expand operations to produce more milk. In a study entitled what difference does a visit make? Changes in animal welfare perceptions after interested citizens tour a dairy farm in North America by Ventura, Marina, Wittman, and Wearly (2016) showed that education and exposure tours to livestock farming areas may resolve certain concerns while other concerns will likely persist especially when practices conflict with deeply held values.

5.2 Input Supply Support

The observed Cronbach's alpha value of Support for input supply factor, was 0.8034 which suggested that rating on level of AI serves provision, dairy feeds provision and clinical services variables form one latent factor for support for input supply. Yazman (2012) observed that USAID in its target countries invested in input supply and services which included veterinary services and improved genetics as a way of transforming the dairy value chains. With respect to provision of dairy feeds, two milk cooling plants which had their own agrovet outlets availed the feeds to their registered members at fair prices and on credit basis to be repaid from monthly milk sales while others obtained the feeds from the private agrovet shops. A study carried out in Nyandarua District by Omiti, Otieno, Nyanamba, and McCullogh (2009) also revealed that dairy farming co-operatives significantly contributed to the development of the dairy cooperative milk marketing by provision of farm inputs and services at relatively lower costs. Rawlikowska and Andrzejewska (2016**)** in their study in Poland on dairy farmers' relations with input suppliers noted that farmers had on average a long and stable cooperation with feed suppliers and that farmers who purchased feed directly from feed producers had a significantly larger milk production, received significantly higher milk price and discount from the feed supplier as opposed to those who purchased from an intermediary operating in the animal feed sector. Azabagaoglu (2004) notes that low uptake of feeds as a problem in dairy production is attributed to high feed prices.

5.3 Support for Marketing

Regarding support for marketing factor, the Cronbach's α test score was 0.4894 which was less than 0.5. This suggested that although the variables of rating on level of transport services, price margin for a litre of milk and promotional advertisements loaded heavily on Support for marketing factor, they however do not consistently measure support for marketing.

From the study, It was observed that one milk cooling plant had made great progress by acquiring a truck for the purposes of transportation of chilled milk from the cooling plant for distribution to retailers and other main consumers while the other cooling plants used motorcycles to assist member milk producers pick their milk from the collection centres to the cooling plants. The milk producers utilizing the milk cooling plants transport services were charged at an average cost of Ksh 3.50 per litre of milk which was relatively costly. According to Otieno, Irura, Odhiambo and Mairura (2009) high transport costs significantly reduced the percentage of milk supplied to the marketing channel because they reduced farmers' gross margins. The rest of the milk producers used alternative modes to deliver the milk to their respective outlets and consumers.The poor state of roads in the study area was a problem of major concern to most producers. A study by Zaibet and Dunn (1998) and Makhura (2001) using probit models, showed that availability of own or hired transport (van or truck) was positively related to market participation regardless of location of a household. Similarly, Serunkuuma, Omiat, and Ainembabazi (2010) found that participation in maize, cassava, banana and credit markets was significantly higher among smallholder households that owned transport equipment than those who did not, reflecting the importance of such assets and other means of transport in reducing travel time and cost to markets by farmers.

From the study, the average milk prices per litre offered by the community cooling plant of ksh 44 was lower than the one offered by the open market of Ksh 52. As observed earlier, more milk producers preferred to sell their milk through alternative channels to the community milk cooling plant because of reluctance to lose the Ksh 8 margin. A study carried out on milk marketing in India by Grover et al. (1990) revealed that prices offered by the informal sector were higher in areas where cooperatives were present, as an alternative channel. Also the findings of Staal et al. (1996) established that spot sale of milk tended to be at higher unit price than sales where the producer only got paid a month later.

In the United States, arising from the American Agricultural Marketing act of 1937, the federal price supports and federal milk marketing orders were established and their function was to set minimum prices for raw fluid-grade milk according to its use that processors must pay to dairy farmers (Manchester, Weimar,& Fallert, 1994). A study by Balagtas, Smith, and Sumner (2007) in America aimed at identifying the effect of milk marketing orders on the Grade A premium and on the Grade A share. Over time and across states they found a strong econometric support for the hypothesis that marketing orders raise the premium paid for Grade A milk, which in turn encouraged a shift towards the production of Grade A milk for manufactured dairy products.

In the area of study, efforts in marketing were measured through advertising initiatives put in place by the milk marketing channels and outlets. This fell under promotional choices as conceptualized by Bovee and Thil (1992) in their definition of a marketing strategy. Evans & Berman (2007) defined promotional strategies as assertions on communication strategy to be used to inform, persuade and remind people about an organization's goods and services.

The level of outreach through outdoor posts or bill boards, point of sale material use and leaflets was assessed by producers in the study area and rated. It was observed that visible efforts in advertising had been made by only one community milk cooling plant which had put big poster put on the body of their vehicle that was used for fresh and chilled milk distribution.

While studying the impact of marketing strategies on the business performance of sachet products, Shohrowardhy (2015) observed that promotional strategy influenced the sale of the products more than the pricing strategy. Bell, Parker and Hendon (2007) examined the importance of advertising as a marketing communication tool to small business owners and found that the business owners were not aware of the best use of their advertising expenditures. This seemed to explain the observation made in this study, where visible efforts in advertising had been made by only one community milk cooling plant.

6. Conclusion

Producers are said to be the weakest actors in the milk supply chain, with supply side limitations, lowest bargaining power and little economic benefit. This paper explored the support services delivered by service providers to smallholder milk producers to ensure sustainable production and the system operates efficiently for consumers and producers. Based on the analysis, it was concluded that though efforts have been made to provide support services to producers,slightly more services have a satisfaction rating of below average and uptake of milk transport services as offered by the cooling plant was still low and is linked to the low producer milk prices and consequently making the provision of this service and others by the cooling plants inefficient..

From the study, it was also concluded that there was strong support for training to producers through dairy trainings, tours and extensions visits as interventions by service providers to producers. There was also strong support for input supply to producers through dairy cows donations, artificial insemination services and feeds provided on credit to producers. However support to marketing was weak. Milk marketing was predominantly marketed through the informal channels and direct to consumers as the producers received price incentive for large milk volume with minimal quality controls. It is recommended that in order to enhance the proportion of milk that entered the community milk cooling plants (Modern commercial channel), pricing policies based on grade of milk should be put in place so as to attract more producers to join and supply regularly to the cooling plant at premium prices and also to make the producers benefit from the services being offered and quarantee high quality and healthy milk to consumers. For purposes of reaching out to a wider market of consumers, promotional advertisements should be undertaken based on services offered and products sold.

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