WHAT DO WE KNOW ABOUT CLIENTS OF FEE-FOR-SERVICE TRAINING PROGRAMMES IN LIVESTOCK PRODUCTION IN GHANA?

Ameleke, G.Y.,[*]Mantebea, C. and Munkaila, L.
Council for Scientific & Industrial Research (CSIR) – Animal Research Institute,
P.O. Box AH 20, Achimota, Accra, Ghana
[*]*Corresponding author's Email: gameleke@hotmail.com*
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ABSTRACT
The study profiled clients of fee-for-service livestock production training programmes in Ghana and analysed gender differences in clients' characteristics and segments. Secondary data on 128 clients who participated in livestock production training programmes organized between 2020 and 2022 by a research organisation in Ghana were analysed using descriptive and inferential statistics, and cluster analysis. Only a fifth of participants were women; however, most of them had tertiary level education. Majority of clients were aged between 30 and 50 years and had little or no experience in rearing the livestock associated with their training. The analysis further revealed two participant clusters based on age and experience. Moreover, based on comparisons of means using t-test or proportions using chi square or Fisher's exact test, there were no gender differences in the socio-demographic characteristics of participants, composition of cluster members or the share of participants in a particular programme. These findings suggest that training programmes should be designed to meet the needs of both experienced and inexperienced farmers, and younger and older farmers. This paper contributes to the literature on the demand side of fee-based extension services by studying clients who actually paid for training instead of persons who just expressed willingness to pay for training programmes. Moreover, insight is provided into which category of clients patronized fee-based programmes and how they could be better targeted.

Keywords: *Gender and agricultural information, fee-for-service extension services, agricultural training services, cluster analysis, farmer typology, Consumer segmentation*

INTRODUCTION

New technologies are necessary for growth in the agricultural sector. However, farmers or users of these technologies must first become aware of them before they use them. Many models exist for disseminating knowledge on the technologies or innovations. Generally, two broad approaches for extending knowledge on the technologies to farmers have been mentioned. In the first approach, knowledge dissemination and training of farmers on the use of the technologies are free and are done largely by public institutions (Anderson & Feder, 2007). In the second approach, farmers or other clients must pay for the knowledge and services they require in relation to the new technology. This second approach has been dubbed "fee-for-service extension" and may be carried out by

both public and private institutions (Aker, 2011; Anderson & Feder, 2007).

The advocacy for privatization of extension or the institution of fee-paying schemes in developing countries such that users pay directly for agricultural extension services increased in the face of economic difficulties and the need for reform (Uddin et al., 2016; Ulimwengu & Sanyal, 2011). The concern has been whether farmers will pay to get trained or receive advice. Consequently, a strand of the literature has looked at willingness to pay or participate in training. For instance, studies on willingness to pay for training and agricultural services have been done to assess the potential demand for them (Atreya, 2007; Channa et al., 2019; Charatsari et al., 2011; Uddin et al., 2016; Ulimwengu & Sanyal, 2011). Furthermore, gender differences in the willingness to pay for agricultural technology have been investigated (Chiwaula et al., 2018). Similarly, gender differences in the perception or ease of use of technologies (Khoza et al., 2021) have been studied. Although women express high willingness to participate in agricultural extension or education programmes, this is not manifested in actual participation (Charatsari et al., 2013). Indeed, many barriers that hinder their access and thereby suppress their participation have been found (Mudege et al., 2017; Mudege et al., 2015; Quaye et al., 2019; Ragasa et al., 2013).

Women participation in training or extension programmes could be influenced by the commodity the extension or training relates to. Women are known to most commonly own small stock, particularly chicken (Njuki & Mburu, 2013; Yisehak, 2008). However, it is not clear if the pattern of ownership is reflected in the training programmes participated in.

One way to get more farmers to pay for trainings will be to have information on those who have paid to get trained and use it to formulate strategies to make the training more valuable and attractive to them. This information is hardly available. Although a few studies have profiled or developed typologies for farms or farmers who adopt new technologies or use improved agricultural practices (Ahikiriza, 2021; Kaliba et al., 2020; Makate et al., 2018; Sinha et al., 2022). It is not clear if the farmers had to pay for the knowledge or information leading to the adoption of new technologies or improved practices. If they did not, then the typologies developed may not be for the population of clients we are currently interested in. Therefore, developing strategies based on the existing typologies is not likely to yield the best results.

The following issues can be raised from the foregoing: Generally, what is the profile of participants of fee-based training programmes? Specifically,

1. What are the socioeconomic characteristics of participants in fee-based training programmes?
2. Are there gender differences in these characteristics?
3. What do persons participating in fee-based training programmes get trained in?
4. Are there any gender differences in the programmes they get trained in?
5. What participant characteristics might be key for segmenting clients for better training and value delivery?

The primary objective of this study is to profile participants of fee-based training programmes. The specific objectives are as follows:

1. To identify the socioeconomic characteristics of fee-paying participants of training programmes in livestock production and ascertain gender differences in the characteristics.
2. To identify programmes enrolled in by participants of fee-based trainings and to ascertain if their gender differences in programmes participated in.
3. To identify key socioeconomic characteristics that might assist in developing better strategies for targeting clients of fee-based training programmes.

Willingness to pay speaks to the potential to get trained, but those who express willingness to

pay may not participate in training for one reason or the other. It is expected that information from actual participants will provide additional information, arguably more reliable information for targeting farmers and promoting training programmes. Indeed, to move from the expressing of willingness to pay to actually paying for the service, a good knowledge of farmers or clients who pay to participate in the training sessions is critical for better targeting and delivery of training or advisory services (Nettle et al., 2021).

Also, some profiling studies have been done particularly on farmers who have adopted new technologies (Ahikiriza, 2021; Kaliba et al., 2020; Makate et al., 2018; Sinha et al., 2022). Much as the findings of these studies could provide insight into targeting and promoting trainings`, it is not clear if the technologies adopted were obtained for free or not. This is important because participants of fee-based training programmes may differ in their characteristics. Agricultural technology adoption is related to training on the use of agricultural technology or methods since the key focus on both is on the use of technology. Moreover`, adoption of agricultural technologies is often contingent on learning about the technology (Mburu et al., 2024). Yet, information gleaned on profiling of adopters of technology may be somewhat different from information on participants of training programmes. The latter group has more barriers to participating in training than the acquisition and use of tangible technology. Hence the need for the current study.

We employed secondary data on clients who were trained in livestock production by a research institution between August 2020 and July 2022. We used descriptive and inferential statistics as well as cluster analysis to achieve our objectives. To investigate clients' demographic characteristics and share of participants in the programmes, we employed mainly descriptive statistics. To segment clients into customer groups or farmer typologies, we used cluster analysis. First, we used hierarchical cluster analysis to identify the number of clusters. Then we employed the K-Means cluster analysis to identify variables that significantly helped us to allocate clients into the different clusters. To ascertain gender differences in continuous variables such as age and farming experience, we used the t-test. To ascertain gender differences in categorical variables such as occupation, education, and shares of participants we used the Chi square test.

As alluded to earlier, the study contributes to the literature by investigating participants who actually paid to participate in training programmes with the view of segmenting them for more effective training delivery.

LITERATURE REVIEW

In this section, we present a review of what is known about paying for agricultural services or technology (including training) and the typology of farmers who pay for or use agricultural services or technology. Given the paucity of studies on actual payments for training services, we reviewed mostly willingness to pay studies as they are close to actual payments for service by participants who constitute the focus of the current study. While the former speaks to actual demand, the latter speaks to potential demand. Additionally, we focused on the gender composition of participants of the training programmes or users of the services and technologies and the pattern of livestock ownership among women as this may inform the kind of trainings they wish to attend, and their contribution to the household.

Willingness to pay for extension or training services

Typically, studies on willingness to pay have assessed people's willingness to pay and the factors that affect willingness to pay. Socioeconomic factors such as age, gender, education, and farming experience have often been considered in willingness to pay models (Anugwa et al., 2022; Atreya, 2007; Charatsari et al., 2013; Charatsari et al., 2011; Uddin et al., 2016). Overall, the effects of gender and education on

willingness to pay for extension services and technology have been mixed; in some cases, no relationship has been found at all. Also, in a few cases, age has been found not to exert any influence on willingness to pay. Few studies have used farmer experience to explain willingness to pay.

Whereas Uddin et al. (2016) and Anugwa et al. (2022) found positive relationships between education and crop farmers' willingness to pay for agricultural extension services and willingness to pay for climate smart technologies respectively, Atreya (2007) found a negative relationship between education and farmers' willingness to pay for community integrated pest management. However, Charatsari et al. (2013) found no relationship between education and willingness to participate in agricultural education programmes.

Regarding gender, Charatsari et al. (2013) and Chiwaula et al. (2018) found that women expressed higher willingness to participate in agricultural extension programmes and willingness to pay for solar tent dryers respectively. In contrast, Atreya (2007) found that women had lower willingness to pay for community integrated pest management. In assessing the gender differences in the use and preference of agricultural information, Lamontagne-Godwin et al. (2018) noted that women valued interpersonal communication more, a possible reason why the low willingness to pay by women. Uddin et al. (2016) did not find any relationship between women and willingness to pay for agricultural extension services.

While Uddin et al. (2016), Charatsari et al. (2013) and Atreya (2007) did not find any relationship between age and willingness to pay for agricultural extension services or technology, Anugwa et al. (2022) found a positive effect of age on willingness to pay for agricultural technology.

Other studies on willingness to pay have considered the influence of other factors besides sociodemographic factors. For instance, Charatsari et al. (2013) found that women's perception of being looked down on because of their low level of education, was negatively related to their willingness to participate in agricultural education. Also, Ulimwengu and Sanyal (2011) found that while market access positively affected willingness to pay for agricultural services, access to agricultural services and distance to markets negatively affected it. Channa et al. (2019) established that prior awareness of technology is positively related to willingness to pay for it. Expected benefit from the use of technology has also been noted to positively influence willingness to pay for agricultural education (Charatsari et al., 2011). For Nettle et al. (2021), the growth stage of a farm, belief that payment for advice offers control, and endorsement of technology by others positively influence use of fee-for service advice.

Typology of farmers

As alluded to earlier, to target farmers or customers better, it is usual to identify clusters or segments of individuals. Such clusters may be identified using the technique of cluster analysis. Having created clusters, the association of selected variables with the clusters may be tested. A few studies have identified clusters of strata of farmers so that their specific needs could be addressed.

Charatsari et al. (2013) identified three clusters of farmers based on their willingness to pay. The resulting clusters, "young and poorer", "wealthy farmers with more women", and older and poorly educated" were obtained. Clearly, these clusters have dimensions related to age, wealth, gender and education. Kaliba et al. (2020) also identified two strata of farmers - adopters and non-adopters, which were associated with education and marital status. Makate et al. (2018) also observed clusters of climate smart technology adopters that were defined by gender, education, and experience. Furthermore, Oh et al. (2002) analysed two matched markets, younger versus senior and men versus women, and noted that they were not homogeneous. Additionally, Wolf et al. (2022) segmented the wine market by gen-

erations and noted that this was appropriate for determining pricing, product, distribution, and promotion strategies. These studies illustrate the creation of market segments based on age and gender.

Besides socio-demographic factors, psychological capital, which encapsulates an individual's mindset, may also be used. For instance, Chipfupa and Wale (2018) clustered farmers based on their propensity to take risks, how hopeful they are about life, and how forward looking they are.

Segmenting a market or clustering customers according to demographics is popular because it is simple but effective. Furthermore, the required data is easy to obtain. Compared to other factors that can be used to segment markets such as psychographic, geographic and behavioral factors, clustering by demographics is considered the most appropriate for the current study given the scope of the data to be employed.

Women's access to extension

Women's access to extension or training services have been generally found to be low (Foti et al., 2007; Mudege et al., 2017; Mudege et al., 2015; Quaye et al., 2019; Ragasa et al., 2013). This low access has been attributed to a number of factors. Mudege et al. (2015) cite cultural norms as a factor militating against extension access to households. For instance, men regard themselves as representatives of their households and therefore attend training instead of women when the household is invited. In addition, they found that when training is formal like a workshop more men than women attend. Women preferred group-farming activities. Furthermore, Mudege et al. (2017) found that the perception of men as household heads and women as caregivers or helpers who are illiterate and ignorant has implications for women's access to training and information. Ragasa et al. (2013), employing cross-sectional data from Ethiopia and instrumental variable regression found that female heads of households are less likely to obtain extension services. For instance, they found that male heads are more likely to attend meetings, visit demonstration plots or research centres. Also, Quaye et al. (2019) observed that among smallholder farmers in Northern Ghana, more male farmers than female farmers had access to agricultural extension delivery. Male farmers had more financial resources and mobility, which gave them advantage over women when one has to travel to access extension. Foti et al. (2007) in assessing the determinants of willingness to pay for fee-for-service extension, found that more male-headed households were associated with higher willingness to pay. This points to the higher financial capacity of males.

Livestock ownership patterns and the role of women in households

In Africa, livestock ownership patterns have been found to vary between men and women. For instance, Yisehak (2008) noted that men owned more cattle, sheep, goats and equine, while women owned small stock like chicken in Ethiopia. Similarly, Njuki and Mburu (2013) found that women most commonly owned chickens in Kenya, Tanzania and Mozambique.

Women play key roles in the household, which contribute significantly to the improved livelihoods and welfare of their families. For instance, Hoddinott and Haddad (1995) found that increasing women's share of cash income increases the budget share of food and decreases the budget share of alcohol and cigarettes. Also, Lloyd and Gage-Brandon (1993) observed that women's access to the cash economy contributes greatly to the economic wellbeing of households in which children are being raised. Further evidence is provided by Tsiboe et al. (2016), who observed that women participating in non-farm work provide the largest contribution to household food nutrient availability. Additionally, these roles have been changing in ways that could increase women's empowerment. According to Lambrecht et al. (2018), women in Ghana who are primarily agricultural family workers declined from 41.5 percent in 1991/1992 to 34.2 percent in 2012/2013; however, they increased their land holdings by 9.5 percent. Furthermore,

women's participation in self-employment in agriculture and paid wages rose over time. Also, women's share of contribution to agricultural family worker decreased from 38.5 percent in 2012/2013 to 30.1 percent in 2016/2017 based on data from Ghana Living Standards Survey rounds 6 and 7 (GLSS 6 and 7) reports respectively (GSS, 2014, 2019). Although, these shares differ slightly from what is reported for agricultural family worker shares by Lambrecht et al. (2018), they show continued reduction in the share of women contribution to agricultural family workers. Livestock production presents an opportunity that women could take advantage of to generate more income. In this regard, acquisition of the requisite training to be efficient and competitive will be of great importance.

Ghana and the history of Extension

Ghana is a country in West Africa with a population of about 30.83 million people in 2021 (GSS, 2021). In 2019, it had a gross domestic product (GDP) of 164.6 billion cedis at constant 2013 prices and agriculture contributed 18.5 percent of total GDP, while the livestock subsector contributed 2.5 percent of total GDP (GSS, 2020). The country is seeking to increasingly modernize its agriculture as it is considered the backbone of the economy. To this end, systems have been put in place to provide agricultural extension services to farmers.

Agricultural extension services delivery in Ghana was started by missionaries and foreign owned export-oriented companies in the 19th century. However, after independence in 1957, the government became more involved in extension. As the economy became more liberalised the private sector became more involved in the provision and delivery of extension services and targeted mainly export commodities. Also, Non-Governmental Organisations (NGOs) became involved in extension services delivery and funding. While extension services provided by the government and NGOs are mainly free, other private sector providers tie provision of extension services to the provision and sale of inputs to farmers (MoFA, Undated). Research institutions, which are involved in the development of technologies for agriculture, pass on the technologies to extension agents of the Ministry of Food and Agriculture (MoFA) who in turn educate farmers on the use of the technologies. Sometimes, the researchers directly transfer technologies to farmers working in collaboration with MoFA extension agents. Recently, in a bid to generate income internally, research organizations have intensified training of interested clients in the use of their technologies for a fee.

METHODOLOGY

Why profile participants of fee-for-service extension

A buyer chooses an offer that gives him the best value (Kotler & Keller, 2012). Profiling buyers allow a seller of a product or service to know the buyer's requirements better and thus tailors offers to his needs. While offering the best value to the buyer, the seller maximises his profits. Thus, it is mutually beneficial for both buyers and sellers to segment markets or profile buyers. Such profiling is often done based on demographic, psychographic, or behavioural characteristics (Chipfupa & Wale, 2018; Kotler & Keller, 2012; Oh et al., 2002; Wolf et al., 2022). This study profiles training participants based on demographics because it is simple and the data is readily available.

Data analysis

Descriptive statistics were employed to ascertain the demographic characteristics of participants. The distribution of age, gender, educational level, occupation, and farming experience were obtained by computing the frequencies in the various categories. Furthermore, the frequencies of participants attending the various training programmes were also obtained.

The IBM SPSS Statistics software version 24 was used to perform various statistical tests to assess the gender differences in the demographic characteristics and share of participants attending a programme. The difference in the means of age and farming experience of participants were assessed using the t-test. To assess the gender

differences in occupation and education, these categorical variables were first converted into binary variables and a Chi-square test was performed. The two categories of education were "tertiary and non-tertiary" while those for occupation were skilled agriculture and non-skilled agriculture. This was done to fulfil the requirement that for a chi-square test to be valid, the expected value in each cell should not be less than five (5).

The hypotheses tested were as follows:

Ho: There is no difference in the mean age of men and women participants.

H1: The mean ages of men and women participants differ.

Ho: There is no difference in the proportion of men and women participants across the different levels of education.

H1: The proportion of men and women participants differ by education.

Ho: There is no difference in the proportion of women and men engaged in different occupations.

H1. The proportion of men and women engaged in different occupations differ.

To assess if the programmes participated in by men and women differed, the following hypotheses was tested:

Ho: The proportion of men and women participating in the different programmes does not differ.

H1: The proportions of men and women participating in the different programmes differed.

Cluster analysis was performed to segment participants into clusters. Firstly, to identify the number of clusters, the hierarchical cluster analysis was performed using Ward's method. Next, the K-means cluster analysis was performed and the variables that were statistically significant in helping divide the participants into various clusters were identified.

Clustering is a method which groups observations (in this case observations on age, education, and farming experience) so that members of a group are similar to each other than members of another group. Hierarchical clustering starts by treating each observation as a cluster. Then it identifies two clusters that are closest. Next, it merges the two most similar clusters. This iterative procedure continues till all clusters are merged. A dendrogram, a tree like structure, records the sequences of merges and splits and shows the relationship between the clusters. Cutting the tree at different heights yields different number of clusters. The optimum number of clusters is determined by cutting the tree at a height where little decreases or increases in the height does not result in changes in the number of clusters. Similarity in clusters is measured by the distance between them and may be represented by the Euclidean distance. The Wards method is often employed as it minimizes the variations in distances and creates equal cluster sizes. The number of clusters obtained may be used in k-means clustering to assign members to clusters.

In K – means clustering, k number of centroids (locations that represent the centre of clusters) are identified and data points are allocated to the nearest cluster while keeping the centroids as small as possible. The clustering process starts first with a group of randomly selected centroids which are used as the initial points of every cluster. Then iterative computations are made to optimize the position of the centroids. The process stops when all centroids are stabilized and there is no change in their values and the observations are split into the final k clusters. K-means clustering requires the following:

1. All variables should be continuous and
2. The number of clusters should be specified aprori. The significance of the variables in splitting data points in to clusters was tested using analysis of variance (ANOVA).

The variables employed were age, education, and experience and the following hypotheses were tested regarding the usefulness of each variable in splitting training participants into clusters.

Ho: Age is useful for splitting training participants into clusters

H1: Age is not useful for splitting training participants into clusters.

Ho: Education is useful for splitting training participants into clusters.

H1: Education is not useful for splitting training participants into clusters.

Ho: Farming experience is useful for splitting training participants into clusters.

H1: Farming experience is not useful for splitting training participants into clusters.

An additional hypothesis was tested regarding differences in gender composition of the two clusters as follows:

Ho: The proportion of men and women in each cluster does not differ.

H1: The proportion of men and women in each cluster differs

Source of data

Data was obtained from a research organisation's records on participants of training programmes in livestock (pig, poultry, grasscutter, sheep, goats and rabbit) production as well as insect fly larvae production. Data on participants were extracted without any identifying information such as names, codes, phone numbers or email addresses. The extracted data included gender, age, level of education, occupation, farming experience, and region in which farm is located or is intended to be located in future. The data covered the period 2020 to 2022.

The Institute periodically organises training for the public in livestock production several times a year. For one day training programmes (grasscutter and rabbit production), a fee of GH¢ 250[1] was charged from 2020 to 2022. For training in poultry production and sheep and goat production, which lasted two days each, GH¢ 500 was charged. For training in pig production and black soldier larvae meal production which lasted three days, GH¢750 was charged. These training programmes were advertised on social media platforms including Facebook and WhatsApp platforms and were open to all members of the public.

[1]*The average annual Ghana Cedi-US dollar exchange rates were 5.6, 5.8, and 8.4 in 2020, 2021, and 2022 respectively.*

RESULTS AND DISCUSSION

In this section, results are presented on the socioeconomic characteristics and the tests of gender differences in the characteristics. In addition, the share of participants who took part in the programmes and the test of gender differences in the programmes they trained in are presented. Finally, the characteristics, which significantly aid in segmenting clients are identified.

Demographic profiles of participants and gender differences

Participants were predominantly men (80 percent). The preponderance of men at the training sessions is supported by Mudege et al. (2015), who found that when training is formal, more men than women attend compared to women, as women preferred group farming activities. According to Lamontagne-Godwin et al. (2018), women value interpersonal communication and informal sources of agricultural information more. Thus, instead of coming for formal training, they may prefer to learn from their friends or other informal sources. Furthermore, the current findings agree with Ragasa et al. (2013), who found that female headed households were less likely to get extension services. Additionally, they observed that male heads were more likely to attend meetings, visit demonstration plots or research centres. Other studies have attributed the presence of more men at trainings to cultural norms where men regard themselves as representatives of households and therefore attend meetings instead of women (Mudege et al., 2017; Mudege et al., 2015) and greater financial resources and mobility of men (Quaye et al., 2019). In Ghana, the proportion of households owning or operating a farm is 44.1 percent (GSS, 2019). Of the household members who own or operate a farm, 46.4 were women. It was

expected that about this proportion (46%) of participants would be women. However, it is only half of it.

Also, the majority of participants (three quarters) were aged between 20 and 49 years. They were part of the actively working population who were looking to take up agriculture as their primary occupation or a secondary occupation for additional income. Participants on retirement constituted nine (9) percent. Persons over 50 years old could be preparing for retirement or were already in retirement and seeking to exploit opportunities in livestock production. The literacy level of participants was high with about two-thirds having tertiary level education qualifications. While 20 percent of participants were skilled agricultural workers, 60 percent of participants were managers (including businessmen and top civil servants), professionals, or technicians and associate professionals.

Most participants (60 percent) had less than one year of farming experience or none at all. About 30 percent had between one and six years of experience in farming, while the rest had more than six years of experience (Table 1). Clients' participation in this fee-for-service mode of extension suggests that they may be more commercial oriented and place a higher value on the information they are purchasing from the training sessions (Anderson & Feder, 2007).

The hypothesis that there were no gender differences in mean age and farming experience of participants could not be rejected at the 5 percent significance level. Similarly, the hypothesis that participants' educational level and type of occupation did not vary by gender could not be rejected. Thus, although women were the minority of participants, there were no gender differences in the characteristics of participants (Table 2).

Share of clients participating in training programmes and gender composition

Over the period 2020 to 2022, the most patronized training programme was grasscutter production, followed closely by pig production with 39

Table 1: Demographic characteristic of participants

Item	Frequency*	Percentage
Gender		
Men	103	80.5
Women	25	19.5
Total	128	100.0
Age (years)		
20 – 29	21	16.8
30 – 39	36	28.8
40 – 49	37	29.6
50 – 59	20	16.0
60 and above	11	8.8
Total	125	100
Education		
Basic	8	6.5
Secondary	35	28.5
Tertiary	80	65.5
Total	123	100
Profession		
Managers	27	21.8
Professionals	33	26.6
Technicians & associate professionals	14	11.3
Clerical support workers	1	.8
Services & sales workers	5	4.0
Skilled Agric Forestry & fishery workers	27	21.8
Craft & related trades	6	4.8
Plant & machine operators	4	3.2
Retirees	7	5.6
Total	124	100
Farming experience		
Less than 1	75	58.6
1 to 2	23	18.0
3 to 4	8	6.3
5 to 6	6	4.7
Greater than 6	16	12.5
Total	128	100.0

**Note, the totals are not the same for all variables because of missing data*

Table 2: Gender differences in demographic variables (Age, farm experience, education, profession)

Continuous variables	Men (mean)	Women (mean)	t-test (difference)/ chi square test	Significance
Age (years)	41.85	41.64	0.210	0.241
Experience	2.37	1.72	0.653	0.541
Categorical variables	Men (Frequency)	Women (Frequency)	Total	Fisher's exact test
Education				0.156
Non-tertiary	38	5	43	Df=1,
Tertiary	62	18	80	
Occupation				0.591
Skilled agriculture	23	4	27	Df=1
Non-skilled agriculture	76	20	96	

and 38 percent of clients respectively. Ten percent of participants were trained in black soldier fly larvae meal production, while 6 percent were trained in poultry production. Training in rabbit production was one of the least patronized. Sheep and goat production training for which no vigorous advertisement had been done was participated in by only 2 percent of participants (Figure 1). According to (GSS, 2019), the highest number of households (1,115,757) kept chicken while the lowest number of households kept grasscutter (2,186) in Ghana. In contrast, the share of participants paying to be trained in poultry was less than that for grasscutter production. This means that most participants preferred to acquire knowledge in grasscutter production from formal training.

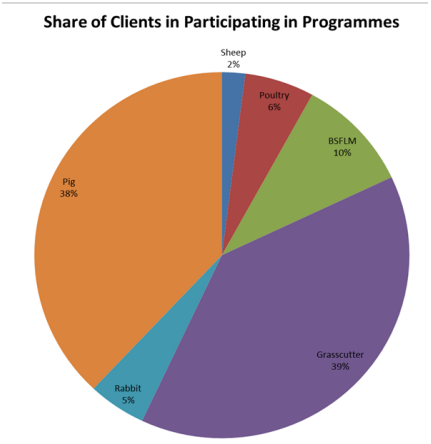

Figure 1: Share of participants attending training programmes

The hypothesis that the share of participants in the various training programmes did not vary significantly by gender could not be rejected. (x^2 (5, 103) = 2.975, p=0.70) – (Table 3). The failure to reject the hypothesis is also reflected in the high correlation between the proportion of all women and all men participating in the training programmes (Spearman rank correlation = 0.88, P=0.05; Pearson correlation = 0.96, p=0.01). Arguably, trainees undertake training in the production of livestock species they own or intend to own in future. Therefore, these results contradict findings of studies conducted in sub-Saharan Africa which assert that women own more small stock including poultry than men (Njuki & Mburu, 2013; Yisehak, 2008).

Customer segments and gender composition

Figure 2 indicates that there are two clusters of participants. A cut at a height of 17 when moved left and right does not readily result in more than two clusters, making this solution of the number of clusters stable.

Table 3: Participation in training programme by gender

Programme	Men (Percent)	Rank	Women (Percent)	Rank
Pig production	38.8	1	36.0	2
Rabbit production	5.8	5	0.0	5
Grasscutter production	36.9	2	48.0	1
BSFL meal production	9.7	3	12.0	2
Poultry production	6.8	4	4.0	4
Sheep and goat production	1.9	6	0.0	5
Total	100 (N=103)		100 (N=25)	

**6 cells (50%) have expected value less than 5*

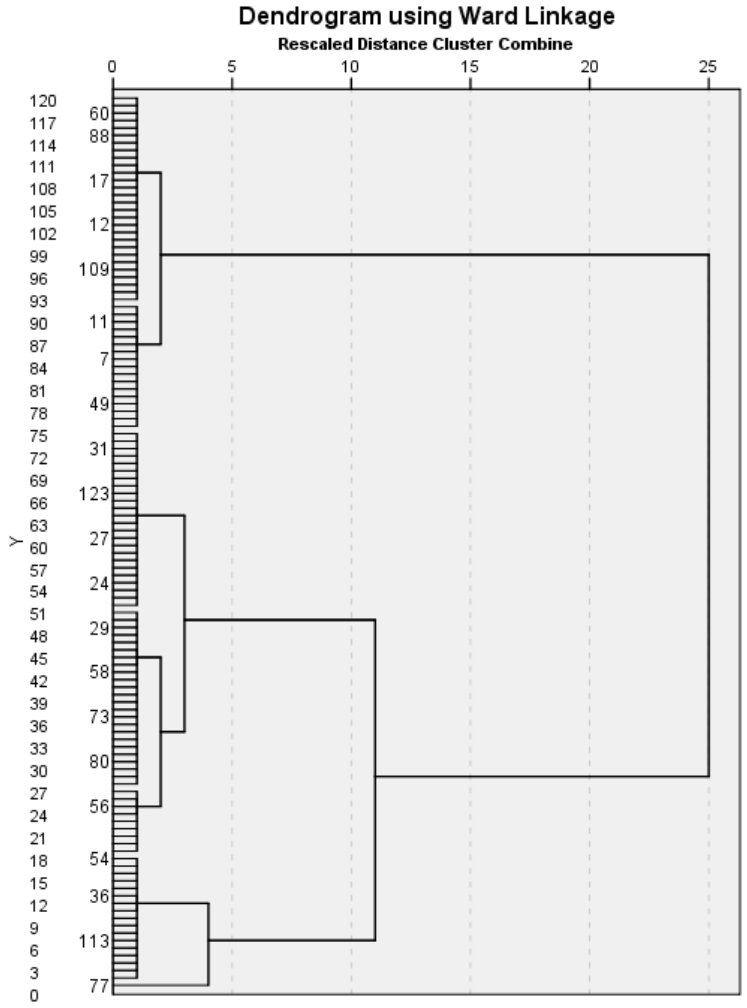

Figure 2: Hierarchical cluster analysis of participants in training programme

The analysis of variance results associated with the k – means cluster analysis indicates a non-rejection of the hypothesis that age of participants and their farming experience in years were significant in discriminating between the two clusters (Table 4). The association of cluster to age is similar to findings by Charatsari et al. (2011) and Oh et al. (2002) while the association of cluster to experience is similar to Makate et al. (2018) findings.

However, the hypothesis that the proportions of women and men in the two clusters do not differ could not be rejected (Table 5). This means that there were similar proportions of men and women in the two clusters identified.

This appears contrary to Makate et al. (2018) and Oh et al. (2002), who defined clusters based on gender. If we use willingness to pay as a proxy for actual payment to obtain agricultural training or education, then the current finding that there are no gender differences in the clusters is similar to the finding by Uddin et al. (2016), who observed that gender does not affect willingness to pay for agricultural extension services. However, it is contrary to the finding of a positive relationship between willingness to

Table 4: Final cluster centres and significance of variables allocating participants into final clusters

Characteristic	Cluster 1	Cluster 2	F	Significance
Age (years)	53.85	34.23	F=244.78, df =(1,118)	0.00
Education	2.67	2.54	F=1.34, df = (1,118)	0.25
Experience (years)	3.55	1.40	F=5.411, df = (1,118)	0.02
Number of cases	46	74		

Table 5: Gender composition of clusters

Characteristic	Cluster 1	Cluster 2	Fishers exact test	Significance
Gender				0.81
Men	38	59		
Women	8	15		
Total	46	74		

Table 6: Regional distribution of participants' farms

Region	Frequency	Percent	Rank
Ashanti	6	5.2	5
Eastern	34	29.6	2
Central	10	8.7	4
Volta	13	11.3	3
Greater Accra	49	42.6	1
Western	2	1.7	6
Brong Ahafo	1	.9	7
Total	115	100.0	

pay and gender (Charatsari et al., 2013; Chiwaula et al., 2018) and a negative relationship between willingness to pay and gender (Atreya, 2007).

Participants had farms or were considering setting up farms in seven of the 16 administrative regions of Ghana. The Greater Accra region had the highest percentage of participants (4 percent); this was followed by Eastern region with about 30 percent of participants (Table 6).

These two regions were closest to the training venue. Thus, proximity to the training centre could have affected the numbers coming from the other regions.

CONCLUSION

The need for users to pay for agricultural services and innovations has been emphasised. To identify ways of making this possible, numerous studies on willingness to pay for agricultural services have been conducted. This is an ex-ante way of establishing potential demand for agricultural services. Another way of obtaining information to promote user payment for these services is to study the actual people who demand them.

This study analysed participants of fee-based livestock training programmes in Ghana. The study sought to 1. identify the socioeconomic characteristics of participants in fee-based training programmes and ascertain if there were any gender differences in the characteristics. 2. identify programmes patronized by clients of fee-based training programmes and ascertain if the proportions of men and women attending the programmes differed, and 3. find variables that could be used to cluster participants and ascertain if there were differences in the gender composition of the clusters identified.

We learnt that while the majority of participants were between 20-49 years, a sizeable proportion were over 60 years. Also, the majority of the participants were highly educated with tertiary level education. Furthermore, we learnt that training in pig and grasscutter production were the most patronized. In addition, the primary occupation of most participants was not skilled agricultural work. About a third of participants had 1 – 6 years of experience in farming commodities other than what they had come to seek training in. The socioeconomic characteristics of participants did not vary among men and women, although, women were the minority of participants. Furthermore, clients could be put into two distinct groups or segments based on age and farming experience. Nevertheless, the composition of the groups did not vary by gender.

It is striking that neither socioeconomic characteristics nor programmes patronized differed by gender. Additionally, cluster membership did not also differ by gender. Since clusters were formed based on socioeconomic characteristics which themselves did not vary by gender, it is not surprising that the proportions of men and women in the clusters did not differ.

This study contributes to existing literature on the demand side of fee-based training programmes. Most existing studies have dealt with the willingness to pay for training services and to determine factors that influence such willingness to pay. The current study contributes to the literature by studying persons who actually took part in fee-based training programmes. Some of the earlier findings have been confirmed. For instance, the preponderance of men at training sessions was confirmed. Participation of women in fee-based training could potentially be explained by their financial position, the duration of training schedules, culture, and their role in the household. The study also contributes to the literature on segmentation of markets for better targeting.

It could be argued that the population of clients dealt with were largely literate in information and communication technology and had some presence on social media. Thus, the results should be read with this group of people in mind. The illiterate and those not on social media platforms may not have been represented adequately.

A practical implication emanating from this study is that training programmes should be designed to meet the needs of inexperienced and experienced farmers as well as younger and older farmers to increase the value of the training.

Women representation in the training programmes is not limited by livestock specie the training relates to. Yet, women participation in the training programmes was relatively low. Thus, some form of incentive could be introduced and targeted at them to promote their participation. It is suggested that a study is designed and implemented in future to test the effectiveness of such an incentive mechanism aimed at boosting women participation in fee-for-service extension programmes. Government could facilitate their employees interested in livestock production, especially those nearing retirement, to enroll in such training programmes to equip them with the necessary skills.

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