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INSTITUTIONAL FACTORS INFLUENCING COMMERCIAL LARGE-SCALE OYSTER MUSHROOM PRODUCTION IN THE GREATER ACCRA REGION OF GHANA

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ABSTRACT

A well-functioning public or private institution is required to promote the commercialisation of agriculture. In Ghana, the Mushroom Unit of the Food Research Institutes spearheads mushroom commercialisation. It is, however, unclear which of the Food Research Institute's (FRI) services to mushroom farmers are most beneficial to enhance mushroom commercialisation in the country and what factors influence farmers' choice to access these services. We conducted a census on 153 oyster mushroom farmers in the Ga East and Adentan Municipalities in the Greater Accra Region of Ghana to seek their perceptions on the level of importance they associate with the services of the Mushroom Unit for commercial mushroom production and to determine the relationship between farmers' choice of FRI services and background characteristics of farmers. We collected the data using a structured interview schedule. We analysed the data using frequency, mean percentage, standard deviation, the Garrett Ranking Technique, and multinomial logistic regression. The results revealed that training in mushroom cultivation techniques was the most beneficial service of the Mushroom Unit for commercial, large-scale mushroom production (64.88%). The spawn supply placed second (55.20%). The extension and farm visits and supply of compost bags, with respective mean scores of 41.06 and 36.89 per cent, were ranked third and fourth, respectively. Farming experience and education positively, whereas membership in farmer-based organisations negatively influenced farmers' choice of FRI services. Stakeholder efforts should concentrate more on training farmers in mushroom cultivation technologies and the production and supply of spawns. Farmers who do not belong to any FBO are strongly encouraged to join FBOs to access agricultural services like training on mushroom cultivation technologies and extension and farm visits at reduced cost to enhance commercial mushroom production.

Keywords: Mushroom commercialization, Garret ranking technique, institutional factors, Mushroom Unit of CSIR

I. INTRODUCTION

Mushrooms have been a delicacy in Ghanaian culture since immemorial (Obodai, 2000). Mushrooms are healthy, medicinal and nutritional (Kortei et al., 2018; Obodai et al., 2015). Guillamón et al. (2010) reveal that cultivated mushrooms have higher levels of proteins, vitamins, dietary fibre, and inorganic minerals than other high-value food resources (e.g.,

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vegetables). The mushroom protein content is estimated to be between 21 and 40 per cent, similar to soybeans and peas, which have a dry protein value of about 42 per cent (Technical Centre for Agricultural and Rural Cooperation (TCARC) 1992). According to Roupas et al. (2012), cultivated mushrooms significantly improve the immune system of humans to fight cancers and viral infections, diabetes, constipation and cardiovascular diseases. Obodai et al. (2015) corroborate that cultivated mushrooms provide a reliable source of protein and supplement the mineral and vitamin sources available to all Ghanaians. Empirical evidence also points out that mushroom production is profitable (Frempong, 2000) and capable of significantly improving the livelihood of the rural and urban poor (Adu-Gyamerah, 2019; Kortei et al., 2018). For this reason, there is a large local demand and a renewed interest in cultivated mushrooms, especially oyster mushrooms, in Ghana (Obodai et al, 2014; Obodai et al., 2015).

Mushrooms were originally gathered from the wild. Their seasonality coupled with the higher consumer demand necessitated cultivation and commercialisation to meet demand. The National Mushroom Development Project, which is now the Mushroom Unit of the Food Research Institute, was established in 1990 by the Government of Ghana to oversee the commercial production of mushrooms (Obodai, 2000). The Mushroom Unit is mandated to promote commercial mushroom production in Ghana, first in the Greater Accra region, where demand is higher (Obodai, 2000; Kortei et al., 2018).

The factors that drive commercial, large-scale mushroom production include production, technology transfer, marketing, and a conducive public institutional and policy environment (Gateri et al., 2009). However, Postemsky et al. (2022) stress that the presence of well-functioning public institution (s) championing the agricultural commercialisation agenda in a country is pivotal to ensuring successful and sustainable commercialisation. These institutions promote agricultural commercialisation market, communication and infrastructure development, as well as research and extension (Dorward et al., 2004; von Braun et al., 1994). As a result, scholarly effort is justified to determine the effectiveness of institutional services as viewed through the lens of the perceived importance of such services to drive agricultural commercialisation in general, and mushroom commercialisation in particular.

The Mushroom Unit of the Food Research Institute (FRI) of the Council for Scientific and Industrial Research (CSIR), is the public institution championing the commercial mushroom production agenda in Ghana. The Mushroom Unit is mandated to systematically establish and encourage the intensive production, use, and export of mushrooms (Obodai, 2000). Despite this mandate, a survey in the year 2000 by Obodai (2000) reported that demand for mushrooms far outpaced supply. Eighteen years later, Kortei et al. (2018) assert that mushroom supply has still been lagging behind demand, due mainly to low local production. For instance, in 2017, the average of mushrooms produced in the country was 758 tonnes (687.65 metric tonnes) per annum (Mushroom – PO – Ghana, 2017). According to Tridge (2021), a total of 28,470 metric tonnes and 28,690 metric tonnes of mushrooms were imported into Ghana in 2018 and 2019 which corresponded to $78,460 and $64,520 respectively. These statistics confirm Kortei et al's. (2018) assertion that more mushroom is demanded than is produced in the country. This

calls for a prioritized investment of stakeholders especially the public institution, in the mushroom value chain, particularly in the production node, to enhance commercial, large-scale production to pace up with local demand and enter the export market. Given that the Mushroom Unit is strategically positioned to champion mushroom commercialisation in Ghana, it is worthwhile to identify which of its services are most beneficial, from the mushroom farmers' perspective, in enhancing commercial, large-scale mushroom production in Ghana, particularly in the Greater Accra region, where commercial mushroom cultivation commenced officially (Obodai, 2000).

Several studies have been conducted on the growing media for mushrooms (Atikpo et al., 2008; Seglah et al., 2019), the influence of technology on mushroom production (Kortei, Odamtten, Appiah, et al., 2015; Kortei, Odamtten, Obodai, et al., 2015), the consumption levels of mushroom (Kortei et al., 2018), mushroom value chain (Ahenkora, 2016; Ahenkora et al., 2013), willingness to pay for edible mushrooms in Ghana (Owusu & Dekagbey, 2020), profitability and livelihood potential of mushroom production (Asare et al., 2021; Frempong, 2000), adoption of mushroom production (Agyeman, 2019) and sources of information for mushroom production (Kavi et al., 2018). However, limited research has been conducted to reveal the dominant and the most beneficial services of the leading public institution in Ghana, the Mushroom Unit, for commercial, large-scale mushroom production. Knowing this is important to inform the Mushroom Unit in the prioritization of its services toward commercial mushroom production in Ghana. It will also inform other stakeholders and development partners such as USAID, DANIDA and the EU about which mushroom production services are to receive more investment attention and investment priority to improve commercial mushroom cultivation in the country in general, and the Greater Accra region in particular.

This research sought to achieve three objectives: first, to analyse the demographic characteristics of the mushroom farmers in the study area; second, to determine the most beneficial services of the Mushroom Unit for commercial mushroom production in the study area and lastly, to determine the relationship between socio-demographic characteristics of the farmers and their choice of the CSIR-FRI services.

II. MATERIAL AND METHODS

The study was a descriptive cross-sectional survey design, which used a validated structured interview schedule to collect data from small-scale mushroom producers registered with the Mushroom Growers and Exporters Association of Ghana in the Ga East and Adentan Municipalities in the Greater Accra region. Mushroom producers from these two areas were chosen because they receive regular services from the Mushroom Unit of CSIR. Also, according to the MUGREAG records, these two towns have the highest number of mushroom producers in the Greater Accra region. In all, 210 small-scale mushroom producers from the Ga East and Adentan Municipalities registered with MUGREAG as of the period of the data collection (Table 1) were included in the study. A Census of the small-scale mushroom producers was carried out through a survey, targeting all the mushroom farmers. After a brief introduction of the research aim, participants were given the option to either participate in the study or otherwise. Thus, the participants' consent was sought before they were included in the

study. For one month, that is, from February to March 2021, hundred and fifty-three (153) of the target population were interviewed. This represented a response rate of 72.86% which according to Baruch (1999), is good for analysis to proceed since the minimum response rate for a survey employing primary data from individuals is approximately 53%. Table 1, shows the breakdown of respondents by municipality.

Table 1: Population of the study and response rate

Municipality/District	population	Response rate
Adentan	135	110 (81.5%)
Ga East	75	43 (57.3%)
Total	210	153 (72.9%)

Source: Field data (2021).

From Table 1, the Ga East district recorded a low response rate because many of the farmers were not available during data collection due to the partial lockdown as part of measures to contain the COVID-19 pandemic in the district. The researchers developed a validated structured interview schedule for data gathering following Walford's (1998) recommendations. There were two parts of the instrument: Sections A and B. Section A requested details on the farmers' demographic characteristics, including their age, education levels, years of experience in growing mushrooms, marital status, and membership in the farmer association. Section B contained four identified services the Mushroom Unit of CSIR provides to the mushroom farmers for which the respondents were asked to assign ranks based on their perceived extent of benefit towards commercial, large-scale mushroom production. The ranks ranged from 1st to 4th. 1st represented the most beneficial service and 4th represented the least beneficial service. The study's demographic data were coded and put into IBM SPSS, while the information on the ranks for the services provided by the Mushroom Unit was entered into Excel. The data were analyzed using the Garret Ranking method, frequencies, percentages, means, and standard deviations.

An expert interview with the Head of the Mushroom Unit was undertaken to reveal the services of the Mushroom Unit for ranking. According to the interview, the Unit provides four services to mushroom producers in the region to boost mushroom commercialization: training on mushroom cultivation technologies (such as composting, sterilization, incubation, spawning, and cropping), extension and farm visits, spawn supply, and compost bag supply. These services were confirmed by a review of documents and an interview with the Chairperson of MUGREAG. The four services were presented to the mushroom farmers to rank them according to their perceived extent of importance to enhance commercial mushroom production. When the services were presented to the farmers for selection and ranking, they were not prearranged. This was done to prevent "leading selection and ranking" — a situation in which a farmer would select and rank the services in the order in which they are prearranged. However, the researchers knew the order in which the services appeared before presenting

them to the farmers for selection and ranking. This helped to compute the Garrett values and percent positions and subsequently the Garrett mean scores (Garrett, 1981).

"Importance" in this study was defined as the extent to which the services aided commercial mushroom production. The data were analysed using the Garret Ranking method. A rank of 1 represented the most beneficial and a rank of 4 represented the least beneficial. The ranking included an in-built test of agreement approach, in which the mean of scores was calculated based on the number of people who ranked the service. The ranking of the services was done using the Garrett ranking technique. The services of the Mushroom Unit were discussed in order of decreasing benefits as perceived by the mushroom producers. This method of ranking is highly feasible and is used primarily to determine the significant factors from the respondents (Garrett, 1981). According to Aleeswari et al. (2019), this method of ranking is highly feasible and is used primarily to determine the significant factors from the respondents.

Using the Garrett Ranking Formulae and the Garrett Ranking Conversion Table (Appendix A), the Garrett ranks were calculated (Garrett, 1981). The formula was used to calculate the percentage position of each rank, and the Garret Table was used to convert the percentage position values into Garrett Values. (Garrett & Woodworth, 1969). Below are the Garrett Formulae:

Percent position = 100(Rij – 0.5)/Nj

Where Rij = Rank provided for the ith variable by the jth respondent;

Nj = the number of variables ranked by the jth respondents.

The estimated per cent position was translated into scores using Garrett Table (Appendix A).

The scores of each mushroom producer were applied to each Mushroom Unit service (Garrett, 1981). The total value of the scores and mean values of the scores were determined. The Mushroom Unit service with the highest mean value was adjudged the most beneficial for commercial large-scale mushroom production (Garrett & Woodworth, 1969).

Econometric analysis

The relationships between the dependent variable (CSIR-FRI services) and independent variables (socio-demographic characteristics: age, educational level, farming experience and membership in farmer organisation) were determined using logistic regression analysis. The logistic regression model is depicted as follows:

$$\ln(p/1\text{-}p) = \beta_o + \beta_i X_i$$

where p is the probability of CSIR-FRI services, (p/1-p) is the odds of CSIR-FRI service choice, o is a constant, and X_i is a vector of independent variables. (Grimm & Yarnold, 1995) demonstrate that logistic regression is an effective method for estimating the individual effects of continuous or categorical independent variables on categorical dependent variables.

The multinomial logistic regression model is often effective when the dependent variable is a polytomous category with numerous choices. The core idea was derived from binary logistic

regression (Hosmer & Lemeshow, 2000). The estimates for the parameter can be identified in a multinomial logistic regression model when compared to a baseline category (Long & Freese, 2006). The baseline category in this study was specified as the supply of compost bags. The multinomial logistic regression model with a baseline category would be written as follows:

$$\text{Log } (\pi i/ \pi I) = \alpha i + \beta ix,\ i = 1,\ldots..,I\text{-}1.$$

The logistic model employs baseline-category logits with x as a predictor (Hyun & Ditton, 2007). This multinomial logistic regression model might be useful in modelling situations when the dependent variable is a discrete set of more than two options (Agresti, 1996). In this study, the multinomial logistic regression model was used to estimate the effect of socio-demographic characteristics on the likelihood of choosing a type of alternative CSIR-FRI service for commercial mushroom production activity. The dependent variable and the independent variables used for the multinomial logistic regression are described in Table 1.

Table 1: Description of independent variables used for the econometric analysis

Variables	Description	Measurement
Independent		
Age	Age at last birthday	Number of years
Level of education	Number of years spent in school	Number of years
Farming experience	Years of producing mushrooms	Number of years
FBO membership	Membership in a farmer-based organisation	1=Yes, 0=No
Dependent		
FRI services	1. Training on mushroom cultivation technologies	1=Yes, 0=No
	2. Extension and farm visits	1=Yes, 0=No
	3. Supply of spawns	1=Yes, 0=No
	4. Supply of compost bags	1=Yes, 0=No

III. RESULTS AND DISCUSSION

Results on respondents' background information, as well as the Garret ranking of mushroom services towards commercial mushroom production and the econometric analysis, are presented in this section of the paper

Background information of the mushroom farmers

The average age of the mushroom farmers was 48.37 years, and over 68 per cent of them were men. About 54 per cent of farmers were between the ages of 41 and 60, while 17.65 per cent were between the ages of 61 and 80. The majority of mushroom farmers (81.7%) were married

and lived in households with one to five people. Most mushroom farmers (60.1%) had tertiary education, followed by "O" Level (19%) and Senior High School (19 per cent). Junior High School and "A" Level schooling were the lowest levels of education (0.7 per cent and 1.3 per cent respectively). This indicates that all the farmers received a formal education, which implies that they would be capable of managing their mushroom farms given that effective mushroom farming is both a science and an art (Oei, 1991). Although 0.49 acres on average were utilized for mushroom cultivation, the majority of farmers (86.9%) produced mushrooms on 0.9 acres or less. This shows that, in contrast to the cultivation of staple crops like maize or cassava, growing mushrooms do not require a large amount of land. The farmers had an average of five years (4.56 years) of experience in mushroom production, and they are all members of farmer groups (Table 2).

Table 2: Background information of the mushroom farmers

Background Characteristics/independent variables	Frequency	%
Sex		
Male	104	67.97
Female	49	32.03
Age (years: $\bar{X}$= 48.37, σ= 12.57years):		
21-30	13	8.50
31-40	30	19.61
41-50	40	26.14
51-60	43	28.10
61-70	21	13.73
71-80	6	3.92
Marital status		
Married	125	81.7
Not married	28	18.3
Level of education		
Junior High School	1	0.7
“O” level	29	19.0
Senior High School	29	19.0
“A” Level	2	1.3
Tertiary	92	60.1
Land size for cultivating mushrooms (acres: $\bar{X}$ =0.49, σ=0.32)		
0.9 and less	133	86.9
1.0-1.9	20	13.1
Years of producing mushrooms ($\bar{X}$=4.56, σ=1.94)		
1-5	110	71.90
6-10	42	27.45
11-15	1	0.65
Membership in Farmer Association		
Yes	153	100

Source: Field data (2021).

Ranking of the mushroom unit services toward commercial large-scale mushroom production

Per cent positions were calculated for the Mushroom Unit services using the Garret formula. Based on the per cent positions of the services, corresponding Garrett values were calculated by comparing the per cent positions with the Garrett Table (Appendix A), as presented in Table 3.

Table 3: Percent position and garrett values of the FRI services

S. No.	100(Rij-0.5)/ Nj	Percent position	Garrett Value
1	100(1-0.5)/4	12.5	72
2	100(2-0.5)/4	37.5	56
3	100(3-0.5)/4	62.5	43
4	100(4-0.5)/4	87.5	26

Source: Field data (2021).

To obtain the score for each factor, the Garret values for the Mushroom Unit services were multiplied by their corresponding frequencies. By adding each row, the total Garret sores were obtained (Table 4).

Table 4: Ranking mushroom Unit's services towards commercial, large-scale mushroom production

S. No.	CSIR-FRI Services		1st	2nd	3rd	4th	Total
	Factor	x	72	56	43	26	
1	Training on mushroom cultivation technologies	f	97	45	8	3	9926
		f(x)	6984	2520	344	78	
2	Extension and Farm Visits	f	11	18	74	50	6282
		f(x)	792	1008	3182	1300	
3	Supply of Spawns	f	44	69	22	18	8446
		f(x)	3168	3864	946	468	
4	Supply of Compost Bags	f	5	15	58	75	5644
		f(x)	360	840	2494	1950	

NB: x=Garrett value; f=frequency (number of mushroom farmers ranking a service)
Source: Field data (2021).

Based on the total Garrett scores for each factor, their corresponding mean value of Garret score was obtained by dividing their total Garrett scores by the number of respondents. These mean values were used to determine the most beneficial Mushroom Unit services for commercial, large-scale mushroom production in the study area (Table 5). The results revealed that the Training on mushroom cultivation technologies has the highest Garret mean score of (64.88%), followed by Supply of spawns (55.20%), Extension and farm visits (41.06%) and Supply of compost bags (36.89%), as presented in Table 5.

Table 5: Garret ranking of Mushroom Unit services (contributions) towards commercial, large-scale mushroom production

CSIR-FRI Services	Total	Mean score	Rank
Training on mushroom cultivation technologies	9926	64.88	1st
Extension and Farm Visits	6282	41.06	3rd
Supply of Spawns	8446	55.20	2nd
Supply of Compost Bags	5644	36.89	4th

N=153 Source: Field data (2021)

The results show that training on mushroom cultivation technologies was perceived by the mushroom farmers as the most beneficial service of the Mushroom Unit for commercial large-scale mushroom production. This indicates that mushroom producers perceived the training services of the Mushroom Unit as the most beneficial to commercial mushroom production in the study area. Training provides salient information on new technologies and good management practices which when adopted, can lead to good agricultural practices among farmers, and may translate into high and marketable yield and income (Gautam, et at., 2017). Agricultural training is associated with increased production and poverty alleviation and is noted for being an effective technique for disseminating relevant new technologies (Nakano et al., 2018). Farmers who received training in agricultural production innovations had a better understanding of the production systems and adopted more technologies to attain a higher output (Gautam et al., 2017). Nakano et al. (2018) reported that the dissemination of agricultural production technologies to farmers who had access to extension increased their outputs exponentially per hectare, while the outputs of farmers who did not benefit from such training increased marginally. These studies point out the importance of training in enhancing human capital development for increasing and improving outputs. The results show that the mushroom producers prioritize training on mushroom cultivation technologies as the most beneficial service of the Mushroom Unit for commercial large-scale mushroom production.

The supply of spawn was perceived as the second most beneficial contribution of the Mushroom Unit towards commercial mushroom production, with a Garret mean score of 55.20 (Table 4). The supply of quality spawns is important to the success of commercial mushroom production because growers must utilize certified spawns to enhance the quality and quantity of marketable mushroom yield (Gateri et al., 2009). Given that spawns produced by a research institution (s) are of high quality and enhance quality mushroom yield than are produced by individuals (Gateri et al., 2009), spawn supply by the Mushroom Unit is perceived as very beneficial to commercial, large-scale mushroom production by the mushroom farmers.

Extension and farm visits ranked third with a Garret mean score of 41.06 (Table 4). The result implies that an extension visit by the Mushroom Unit is perceived by the farmers as less beneficial in terms of rank. This may be because farmers receive less of this service. The supply of compost bags ranked fourth of all the services provided by the Mushroom Unit for commercial, large-scale mushroom production, with a Garrett mean score of 36.89 (Table 4). Its lowest rank may be due to inadequate compost bag production and supply by the Mushroom Unit (Ahenkora et al., 2013).

Relationship between background characteristics of mushroom farmers and their choice of CSIR-FRI services for enhancing commercial mushroom production

Table 6: Multinomial logistic regression of the relationship between farmers' choice of FRI services and their socio-demographic characteristics

Services of CSIR-FRI ranked[a]		B	SE	Wald	df	Sig.	Odds ratio	95% Confidence Interval for Exp(B) Lower Bound	Upper Bound
1.Training in mushroom cultivation technologies	Intercept	0.887	9.546	0.009	1	0.926			
	Age	-0.023	0.058	0.155	1	0.694	0.978	0.873	1.094
	Edu Level	1.217	0.650	3.506	1	0.061	3.377	0.945	12.074
	Farming Exp	1.612	0.794	4.117	1	0.042	5.011	1.056	23.767
	FBO	-17.522	1.293	183.642	1	0.000	2.456E-8	1.948E-9	3.096E-7
2.Extension and farm visits	Intercept	2.684	9.562	0.079	1	0.779			
	Age	-0.041	0.058	0.506	1	0.477	0.960	0.857	1.075
	Edu Level	1.193	0.651	3.357	1	0.067	3.297	0.920	11.813
	Farming Exp	1.423	0.796	3.199	1	0.074	4.150	0.873	19.734
	FBO	-18.043	1.311	189.403	1	0.000	1.459E-8	1.117E-9	1.906E-7
3. Supply of spawns	Intercept	-2.845	9.804	0.084	1	0.772			
	Age	-0.061	0.064	0.900	1	0.343	0.941	0.830	1.067
	Edu Level	1.466	0.666	4.853	1	0.028	4.333	1.176	15.971
	Farming Exp	1.674	0.816	4.201	1	0.040	5.331	1.076	26.413
	FBO	-18.683	.	.	1	.	7.691E-9	7.691E-9	7.691E-9

a. The reference category is: 4. Supply of compost bags.
Model chi-square = 21.564; $p<0.05$, –2 log likelihood = 242.448, Pseudo R^2 (Nagelkerke) = 0.159.

The model specification of the relationship between the farmers' socio-demographic variables and their choice of FRI services was statistically significant ($X^2 = 21.564$; $p<0.05$) (Table 6). According to the findings in Table 6, all of the farmers' socio-demographic variables influenced

their choice of accessing FRI services for boosting commercial mushroom production. Specifically, the farmers' choice of Training in mushroom cultivation technologies service by FRI was influenced positively by farming experience and negatively by membership in a farmer-based organization at a statistical significance of 5%. Similarly, at a 5% statistical significance level, the farmers' choice of FRI's supply of spawns (mushroom seeds) was positively influenced by their farming experience and educational level. However, only membership in a farmer-based organization had a negative association with farmers' choice of extension and farm visits of FRI at the 5% statistical significance level.

With the reference FRI service being "Supply of compost bags," farmers with more years of mushroom production experience had 5 times (OR=5.01) probability of choosing to access the Training on mushroom cultivation service than the Supply of compost bags. Farmers who belonged to an FBO were also about 2.5 times more likely (OR=2.45) to access extension and farm visits from the FRI and were about 18% less likely to receive training and farm visit services. Farmers who belonged to FBOs had a 1.5 times (OR=1.45) probability of using extension and farm visit services from FRI and were 18% less likely to do so.

Furthermore, farmers with a higher education level had 4.3 (OR=4.33) times the probability of accessing the spawns from FRI and were around 1.5% more likely to access the spawns. Furthermore, farmers with more years of mushroom production experience had approximately 5 (OR=5.3) times the probability of accessing FRI spawn supply and were about 1.7% more likely to do so.

The results of the study conform with that of studies predicting the factors that influence the use or adoption of agricultural services. For example, Michels et al. (2020) found that the use of smartphones among farmers was positively influenced by farmers' education levels. This is because the use of smartphones requires some reading and writing skills without which farmers cannot use it to benefit their agricultural activities. Similarly, mushroom production is an art and science (Kohsaka et al., 2020), and it requires formal education to enable one to realise the information and skill needed to enhance success in commercial production. Highly formally educated farmers, therefore, can determine information and skill needs for enhancing commercial mushroom production and subsequently seek them. Frimpong et al. (2021) and Amengor et al. (2022) revealed that the farming experience of farmers positively associates with their use of best tomato production practices in Ghana. A long period of farming experience of farming may enable them to know what works and what does not work, and what must be needed to make things work. Mushroom farmers' experience in mushroom production may inform them to judge FRI services as important and beneficial to enhance commercial mushroom production and thus seek such services.

Membership in FBO has also been found to be associated with the adoption of agricultural technologies (Amengor et al., 2022) and access to agricultural services (Anang & Asante, 2020). In their study, Amengor et al. (2022) found that farmers' membership of FBO positively influenced their adoption of improved maize variety in Ghana. Anang and Asante (2020) found a positive relationship between farmers' access to agricultural services and membership in farmer groups. However, this study's finding contrasts Amengor et al. (2022). Mushroom

farmers' membership in FBO, is negatively associated with their choice of FRI services (Training in mushroom cultivation technologies and extension and farm visits). This may be because strong FBOs usually arrange for several programmes for their members to meet their needs at no or very little cost. Furthermore, FBOs can bargain for and get services from service providers at a lower cost than individual farmers obtaining the same services from service providers (Anang & Asante, 2020). These arrangements often meet some of the needs of the farmers which they may have sought from other sources like FRI. The study's findings imply that individual farmers access training on mushroom cultivation technologies and extension and farm visits more than farmers in farmer groups. This implies that such individual farmers may spend more money on obtaining services from the service providers than if they were in farmer groups. Therefore, farmers must be encouraged to join FBOs to spend less on services from service providers.

IV. CONCLUSION

The study analysed the background characteristics of mushroom farmers in Ghana's Ga East and Adentan Municipalities and ranked the four services offered by the Mushroom Unit of CSIR to mushroom farmers for commercial, large-scale mushroom production. All mushroom farmers had a formal education, were members of a farmer's association, and were, on average, 48 years old. They produced an average of 0.49 acres of land. Training farmers in mushroom technologies was deemed the most beneficial service of the Mushroom Unit for large-scale commercial mushroom production, followed by the provision of spawn. Inferring from the study's findings, training in mushroom cultivation techniques is the most important service for enhancing commercial mushroom production. In addition, farming experience and educational level positively associated with farmers' choice of FRI services whereas membership in FBO negatively influenced farmers' choice of FRI services. The Ministry of Food and Agriculture should collaborate with the Mushroom Production Unit of the Council for Scientific and Industrial Research to train mushroom farmers on mushroom production technologies to increase their commercialization potential. The Mushroom production unit should make greater efforts to ensure that spawns of high quality and quantity are made available to farmers to enhance the mushroom's commercialization. Agricultural Extension Agents are encouraged to increase their extension and farm visits to farmers, as the farmers view their visits as influencing their commercialization efforts. Furthermore, the Mushroom Production Unit and Agricultural Input Dealers operating in the study area should increase their supply of compost bags, as the limited availability of compost hinders the commercialization of mushrooms in Ghana's Greater Accra region. Moreover, farmers, especially those who do not belong to any FBO are strongly encouraged to join FBOs to access agricultural services like training on mushroom cultivation technologies and extension and farm visits at lower costs to enhance commercial mushroom production.

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Authors' Contribution

Emmanuel Anobir Mensah, Lawrence Acheampong and Albert Obeng Mensah conceived the idea. Emmanuel Anobir Mensah and Lawrence Acheampong designed the research work. Emmanuel Anobir Mensah, Lawrence Acheampong and Isaac Kwasi Asante collected and processed the data. Albert Obeng Mensah Supervised the work. Emmanuel Anobir Mensah analysed the data. Emmanuel Anobir Mensah, Lawrence Acheampong, Isaac Kwasi Asante and Alber Obeng Mensah interpreted the results. Emmanuel Anobir Mensah wrote the manuscript. Lawrence Acheampong, Albert Obeng Mensah and Isaac Kwasi Asante revised the manuscript. All authors read and approved the manuscript.

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Appendix A: Garrett Conversion Table

GARRETT RANKING CONVERSION TABLE

The conversion of orders of merits into units of amount of "socres"

Percent	Score	Percent	Score	Percent	Score
0.09	99	22.32	65	83.31	31
0.20	98	23.88	64	84.56	30
0.32	97	25.48	63	85.75	29
0.45	96	27.15	62	86.89	28
0.61	95	28.86	61	87.96	27
0.78	94	30.61	60	88.97	26
0.97	93	32.42	59	89.94	25
1.18	92	34.25	58	90.83	24
1.42	91	36.15	57	91.67	23
1.68	90	38.06	56	92.45	22
1.96	89	40.01	55	93.19	21
2.28	88	41.97	54	93.86	20
2.69	87	43.97	53	94.49	19
3.01	86	45.97	52	95.08	18
3.43	85	47.98	51	95.62	17
3.89	84	50.00	50	96.11	16
4.38	83	52.02	49	96.57	15
4.92	82	54.03	48	96.99	14
5.51	81	56.03	47	97.37	13
6.14	80	58.03	46	97.72	12
6.81	79	59.99	45	98.04	11
7.55	78	61.94	44	98.32	10
8.33	77	63.85	43	98.58	9
9.17	76	65.75	42	98.82	8
10.06	75	67.48	41	99.03	7
11.03	74	69.39	40	99.22	6
12.04	73	71.14	39	99.39	5
13.11	72	72.85	38	99.55	4
14.25	71	74.52	37	99.68	3
15.44	70	76.12	36	99.80	2
16.69	69	77.68	35	99.91	1
18.01	68	79.17	34	100.00	0
19.39	67	80.61	33		
20.93	66	81.99	32		