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Farm Households' Livelihood Diversification into Agro-processing and Non-agro-processing Activities: Empirical Evidence from Ghana

*John K.M. Kuwornu[1], Motin Bashiru,[1] Moses Dumayiri[2]
[1]College of Agriculture and Consumer Sciences, University of Ghana Legon, Ghana
[2]School of Business and Law, University for Development Studies, Ghana
*jkuwornu@gmail.com

Abstract: This study seeks to identify the types of agro-processing and non-agro-processing activities in the Upper West Region of Ghana and the factors influencing households' choice of diversification into each of these groups of activities as livelihood strategies. The study employs the multinomial logit model to identify the determinants of diversification. Data were obtained from a survey conducted by the International Food Policy Research Institute (IFPRI) in December, 2012 covering production activities for the 2011 agricultural year. The Primary data were collected from two hundred and fifty (250) food crop farmers selected using a multistage sampling procedure. The empirical results indicate that households in the Upper West Region diversify their livelihoods activities to agro-processing and activities not related to agro-processing. Households who are likely to diversify are females who are high income earners with small farm sizes. Further, educated and asset-rich farmers who produce for subsistence only are more likely to diversify to agro-processing while access to credit will influence diversification but not necessarily into agro-processing. These results have implications for the development of agro-processing ventures in developing countries.

Keywords: *Livelihood diversification, Agro-processing, Multinomial logit model, Upper West Region, Ghana*

1. Introduction

Over two-thirds of the World's poorest people are located in rural areas and are engaged in subsistence agriculture (Todaro & Smith, 2009). In the developing world, the carrying capacity of the agricultural sector is declining as a result of increasing population growth with limited farm sizes (Sisay, 2010). The situation in Ghana is not different especially in the Upper West Region where rural households depend on rain-fed agriculture for subsistence production. Crop production and livestock keeping are largely rural comprising 85% of rural households and 92% of rural Savannah (Ghana Statistical Service, 2008) whose livelihoods are vulnerable to climatic shocks, market volatility, rising prices of agricultural inputs, post-harvest losses and human risk (NDPC, 2005). Rao (2006) therefore, indicates that farming on its own is unable to offer adequate incomes for subsistence among rural households. In the Upper West Region income poverty still predominates as average household annual income remains at US$65.00 and poverty headcount index is 83.9% in 2006 (Ghana Living Standard Survey, 2008).These households need to cope with increasing difficulties in Agricultural production by diversifying into non-farm activities related to farm produce such as processing and trading in food stuff (Marchetta, 2011). This is because small enterprise development has become a growing potential alternative for all stakeholders in rural development (Warren, 2002). In this respect, Al-Hassan et al., (2007) explored the role of agribusiness in providing avenues for smallholders to market produce as a way of agricultural transformation. This results in livelihoods improvement, poverty alleviation and enterprise development among rural households. Even though agribusiness is still rudimentary with little growth (FAO, 2004), opportunities exist in the agro-processing industry for value addition, minimizing post-harvest losses, promoting price stability and increasing demand for local agricultural produce (DANIDA, 2012).

Agro-processing creates employment at low levels of investment that make effective use of local resources (Kindness & Gordon, 2001) and creates vertical linkage with farmers that supply inputs (Overseas Development Institute, 2005). This draws the attention of various stakeholders in promoting agribusiness especially the agro-processing sector. MoFA (2007) maintains that growth in income of households is achievable through Agro-processing. Hence, the development of Small-scale processing enterprises will initiate the path towards agricultural commercialization, reduce waste of fresh produce and increase households' participation in commercial economies (FAO & UNIDO, 2008). Strategies being

put in place by the Ministry of Food and Agriculture for post-production management include improving supply chain management with emphasis on developing clusters of small to medium-scale enterprises, enhancing processors' access to technical advice and logistics, strengthen public and private sector linkages to support agro-processing, providing improved and targeted tax relief for agro-processors and promoting cottage level agro-processing industries with interventions to enhance access to machinery and quality of products (MoFA, 2007). As a result, MoFA has teamed up with some private engineers to fabricate food processing equipment to upgrade the agricultural value chain and minimize post-harvest loss.

Despite all these potentials of the agro-industrial sector of Ghana, households in the Upper West Region still depend basically on on-farm activities for their livelihood. About 86% of them engage in crop production as source of livelihood (Inkoom & Nanguo, 2011).Current research recommends livelihood strategy diversification as a way of minimizing the risk of on-farm activities as well as augmenting rural farm income (see Babatunde & Qaim, 2009). Agro-processing enterprises such as food processing exist in the Upper West Region as alternative livelihood strategies but are believed to be operated by women alone and on a small scale (Marchetta, 2011). However, to the best of our knowledge literature on rural livelihood in the region exclusively concentrate on identification of livelihood outcomes but the factors influencing the choice of livelihood activities by households in the region are not explored. This study seeks to identify the types of agro-processing and non-agro-processing activities in the Upper West Region of Ghana and the factors influencing households' choice of diversification into each of these groups of activities as livelihood strategies. The rest of the study is organised as follows. Section 2 presents the literature review; section 3 presents the methodology, section 4 presents the results and discussion; section 5 presents the conclusions and recommendations.

2. Literature Review

Empirical studies have demonstrated that rural households earn their living basically from primary production activities such as farming. However, farming alone does not provide sufficient income for sustenance among rural dwellers (Rao, 2006; Oluwatayo, 2009). Besides, farming activities in most parts of the developing world are characterized by seasonality implying that households have to rely on different options for their livelihoods in different times of the year (Ward et al., 2004). Therefore, most rural households focused on agro-processing as a form of non-agricultural livelihood diversification (Warren, 2002). Elsewhere in southern Ethiopia livelihood strategies include livestock keeping, crop cultivation, remittance and handcraft (Eneyew, 2012) and in Kenya consist of gifts, petty business and formal employment (Wanyama et al., 2010). Livelihood strategies in the fishing communities in Ghana include Pottering, firewood gathering, fishing, wage labour, construction work and food processing (Ward et al.,2004) and in the Upper West Region include food processing, petty trading, charcoal burning and fuel wood gathering (Bediako & Debra, 2007; Marchetta, 2011). Bediako and Debra (2007) therefore, explain that food processing activities in the region include sheep butter and ground nut oil extraction. Rural households also diversify their livelihoods by migration and non-farm employment (Lay & Schüler, 2008). Such migrants from northern Ghana in particular derive their livelihood from transporting goods for clients in congested market area in the cities in Southern Ghana (Oberhauser & Yeboah, 2011).

Efforts to identify drivers of livelihood diversification have been made by researchers at different places all over the world. Such studies principally underscore the role of socio-demographic, economic and communication factors as main determinants of rural livelihood choice. Demographic factors often highlighted include educational status, households' size, gender, age and marital status; economic factors include income, asset and farm size; and communication factors include access to credit, membership to an organization, awareness of diversification strategies and distance to market. Alwang et al., (2005) conduct a study on livelihood and wellbeing in Central America. Their empirical results indicate that, households depending on agricultural activities are worse-off than those who diversify. They therefore maintain that better educated and male-headed households are more likely to diversify into off-farm activities. Sisay (2010) provides empirical evidence from rural Ethiopia that poor households rely more on off-farm activities while the rich earn more from agriculture. His model result on determinants of participating on off-farm activities however confirms that household size and level of education has a significant and positive influence on diversification.

Positive influence of education on livelihood strategy diversification has also been reported elsewhere by Saha and Bahal, (2010), in Western Kenya (Olale et al., 2010), Southern Ethiopia (Eneyew, 2012), in West Bengal (Khatun & Roy, 2012) and in Ghana (Asmah, 2011). These studies explain that educational status represent household human capital endowment; an increase of which will strengthen the ability of engaging in other livelihood options. Oluwatayo (2009) maintains a different stand on the effect of education on livelihood diversification. He explains that higher educated people in rural Nigeria get better payment from formal employment and do not have to engage in alternative livelihoods. Sisay (2010) reports no significant effect of age on diversification. However, households experience on livelihood options and the desire to diversify increase with age (Olale et al. 2010; Wanyama et al., 2010; Khatun & Roy, 2012). Simtowe's (2010) study on livelihood diversification and gender in Malawi indicates that the likelihood of diversification from farming is more associated with females than their male counterparts. Similar finding is reported by Oluwatayo (2009) in Nigeria but Asmah (2011) in Ghana differs from this opinion. Elsewhere in Kenya where primary occupation of farmers is animal keeping, male-headed households have greater chances of diversifying into crop production due to their relative advantage of access to land hence, Olale et al., (2010) report greater likelihood of men diversifying than their female counterparts.

Saha and Bahal (2010) report negative effect of dependency ratio on the likelihood of livelihood diversification. High dependency ratio is often associated with households with larger family size especially married couples who normally specialized on a particular livelihood. Oluwatayo (2009) and Olale et al., (2010) therefore report that being married has a negative effect on livelihood diversification. Khatun and Roy (2012) confirm negative effect of dependency ratio on diversification but found no significant effect of household size on diversification. Warren (2002) posits that rural enterprise development requires the mobilization of land, labour, access to infrastructure, social relationships and technical know-how. This involves money which most rural poor households are unable to meet. Recent empirical studies therefore, confirm that high income earners can easily mobilize these productive resources and are more diversified than low income earners (Simtowe, 2010; Babatunde & Qaim, 2009). Empirical evidence of positive effect of asset on livelihood diversification has been demonstrated by some resent studies. Lay & Schüler (2008) argue that asset-rich households are more successful at diversification. Prominent among such assets that directly influence livelihood diversification include agricultural farm tools (Ng'anga et al., 2011), ownership of tractor and other machinery (Wanyama et al., 2010), land (Saha & Bahal, 2010; Asmah, 2011), access to credit (Simtowe, 2010; Sisay, 2010; Olale et al., 2010, Wanyama et al., 2010) and irrigation infrastructure (Khatun & Roy, 2012). Larger farm sizes are often associated with specialization in agriculture. Eneyew (2012) shares this opinion when he report strong evidence of negative effect of farm size on livelihood diversification.

Communication plays an integral role but has been reported to have a mixed effect on livelihood diversification. Empirical studies measured this, using different indicators such as membership to an association, distance to market, awareness of diversified strategies, access to public transport, contact with extension service and access to television or radio. Evidence of positive effect of communication on livelihood diversification has been demonstrated with membership to an association (Olale et al., 2010; Wanyama et al., 2010; Khatun & Roy, 2012), access to television, radio, market and public transport (Asmah, 2011), and households' awareness of diversification strategies (Saha & Bahal, 2010). Asmah (2011) however, finds no significant relationship between access to extension and livelihood diversification. Besides, Wanyama et al., (2010) provide a strong evidence of positive effect of distance to market on diversification while Eneyew (2012) reports a negative effect, thus bringing to the fore the inconsistency of evidence about the relationship between communication and livelihood diversification. It is clear from the foregoing discussion that different factors influence livelihood diversification at different places. These factors among other things include those related to household demography, economic and communication factors. However, the effect of these variables differs in magnitude and direction at different locations with different livelihood outcomes. Besides, the fact that none of these empirical studies is conducted in the Upper West Region of Ghana underscores the need to undertake this study.

Households' decisions to diversify their livelihood option have been demonstrated using binary choice models such as the probit regression model (see Olale et al., 2010) when the depended variable is categorical and follows a Bernoulli distribution. However, diversification decision can be modelled using count data when the event of interest is generated by the Poisson process such as number of income

sources (see Babatunde & Qaim, 2009). Diversification decision has been shown elsewhere using share of household income. Models adopted for such analysis include Tobit or ordinary least squares regression (Babatunde & Qaim, 2009; Wanyama et al., 2010; Saha & Bahal, 2010; Oluwatayo, 2009; Khatun & Roy, 2012). Similarly, Asmah (2011) pools cross-sectional data from the 1991/1992 and 2005/2006 Ghana Living Standards Survey (GLSS) and adopts an endogenous switching regression to identify factors influencing livelihood strategy diversification in Ghana.

Some researchers also measure extent of diversification using Simpson index (Khatun& Roy, 2012). Sisay (2010) adopt Heckman two-stage procedure to identify, on the first stage, factors that affect participation in income sources and on the second stage factors influencing the amount of earning from diversification. Bediako and Debra (2007) emerge from a different perspective. They employ a combination of qualitative methodologies such as focused group discussion, seasonal calendars, preference ranking and mixed scoring in identifying rural livelihood outcomes in the Upper West Region. However, most empirical literature on determinants of livelihood diversification consider the distribution of the outcome of interest as categorical and employs the multinomial logit regression (Alwang et al., 2005; Simtowe, 2010; Ng'ang'a et al., 2010; Wanyama, et al., 2010; Eneyew, 2012). The primary objective of this study was to identify factors influencing households' choice for livelihood strategies related to agro-processing and non-agro-processing activities. The determinants of diversification were identified using the multinomial logit regression model due to its simplicity and widely application by recent related empirical studies.

3. Methodology

Sampling, Data Collection and Variables: Data were obtained from a survey conducted by the International Food Program and Research Institute (IFPRI) in December, 2012 to cover production activities for the 2011 agricultural year. The Primary data were basically collected from two hundred and fifty (250) food crop farmers selected using a multistage sampling procedure. Data were collected from Wa Municipal, Wa West District, Wa East District and Nadowli District. Ten (10) farmers were selected as respondents from each community. This constitutes a total sample size of two hundred and fifty (250) respondents selected from twenty-five (25) farming communities in four districts in the Upper West Region.

Table 1: Variables definitions, units of measurement and hypothesized relationships

Variable	Definition	Unit of measurement	Expected Sign
Dependent			
Pij	*i*th household's choice for *j*th strategy	Categorical (Choice for alternative j; Otherwise 0)	
Independent			
GEN	Gender	Dummy (male =1; Otherwise 0)	+/-
AGE	Age	Years	+/-
EDU	Level of Education	Years Spent at School	+
FMSIZE	Farm Size	Hectares	-
HSINC	Household Income	Ghana Cedis	+
OBJCT	Farming Objective	Dummy (Subsistence = 1; Otherwise 0)	+
ASSET	Value of Farm Asset	Ghana Cedis	+
CREDIT	Access to Credit	Dummy (Accessed Credit=1; Otherwise 0)	+
GRP	Group Membership	Dummy (Member =1; Otherwise 0)	

Method of Data Analysis: A rational household choose among different strategies that yields maximum utility. Green (2003) indicates that the utility obtained can be decomposed into observed and unobserved components expressed as:

$$U_{ij}(X_{ij};Z_{ij}) = V_j(X_{ij};B) + \varepsilon \quad (1)$$

Where:

$U_{ij}(X_{ij};Z_{ij})$ denotes the utility of i^{th} individual choosing alternative j; $V_{ij}(X_{ij};Z_{ij})$ denotes the deterministic component of the utility. The deterministic part is modelled using the multinomial logit. Following from Green, 2003; Cameron & Trivedi, 2005; Mpuga, 2008; Eneyew, 2012) the conditional probability of the Multinomial logit model is specified as:

$$prob(Y_i = j / X_i) = \frac{\exp(x_i \beta_j)}{\sum_{j=0}^{k} \exp(x_i \beta_j)} \quad (2)$$

Where j = 1, 2, . . .k. The base category is used to compare other choices by restricting the parameters of the base category to all zero ($\beta_1 = 0$). The first choice category is households who are engaged in farming. The estimation of the multinomial logit is most often by maximum likelihood method. The log likelihood function is:

$$\ln L = \sum_{i=1}^{n} \sum_{j=1}^{k} d_{ij} \log(p_{ij}) \quad (3)$$

The dummy variable d_{ij} takes the value of 1 if an i[th] individual has chosen alternative j, otherwise it takes the value of 0.

Taking the first order derivative of equation (2) yields:

$$\frac{\partial \ln L}{\partial \beta_{kj}} = \sum_{i=1}^{n} (d_{ij} - p_{ij}) X_{kj} \quad (4)$$

The multinomial logit model is interpreted in terms of odds. The odds of outcome m versus outcome n given X depicted by $wm/n(X_i)$ is:

$$wm/n(X_i) = \frac{\Pr o(y_i = m / X_i)}{\Pr o(y_i = n / X_i)} = \frac{\ell^{(x_i \beta_m)}}{\ell^{(x_i \beta_n)}} \quad (5)$$

Simplifying equation (4) gives:

$$wm/n(X_i) = \ell^{(x_i \beta_m - x_i \beta_n)} = \ell^{[x_i (\beta_m - \beta_n)]} \quad (6)$$

Taking the natural logarithm of equation (6) expresses the multinomial logit as linear in the logit:

$$\ln[wm/n(X_i)] = X_i(\beta_m - \beta_n) \quad (7)$$

Equation (7) gives the effect of X on the logit of outcome m against outcome n. The partial derivative of equation (7) gives the marginal effects. This is expressed in equation (8) as:

$$\frac{\partial \ln[wm/n(X_i)]}{\partial X_k} = \frac{\partial X_i(\beta_m - \beta_n)}{\partial X_k} = \beta_{km} - \beta_{kn} \quad (8)$$

Where $\beta_{km} - \beta_{kn}$ means: for a unit change in X_k the logit of outcome m versus outcome n is expected to change by $\beta_{km} - \beta_{kn}$ units.

4. Empirical Results and Discussion

Socio-economic characteristics of the sampled farmers: Results of the survey reveal that out of two hundred and fifty (250) food crops farmers selected for investigation male farmers constitute 68.4% and female farmers constitutes 31.6%. The average age of farmers is 39.3 years. Average household size is 10 persons with farmer's years spent at school averaging 3 years. Farmers in the region cultivate an average farm size of 3.9 hectares. The farmers do not specialize in crop production as they keep an average of 4 crops enterprises. Value of farm asset in some cases is as low as GHS16.00 and not exceeding GHS 57,600.00. The average annual household's income is GHS 6,728.20. Majority (78%) of the farmers engage subsistence farming while the remaining only 22% engage in farming for commercial purpose. Only 32.8% of respondents belong to Farmer Based Organization. Some farmers engage in other livelihood strategies besides farming to augment their farm earnings. These strategies which are of diverse nature are derived from their environment. They comprise of agro-processing activities such as Gari Processing, Shea nut Processing, Food Vending and Pito Brewing. Other activities include Petty Trading, Wage Labour, Animal Rearing, Charcoal Burning, Poultry, Driving, Stone Gathering, Dress Making, Teaching and Hair Dressing. The results in Table 2 reveal that 49 farmers accounting for 19.6% of the food crop farmers do not diversify in to any other livelihood option. This group of households rely

entirely on the output of crops cultivated for their livelihoods. This result implies that about 80.4% of the farmers have at least engaged in other livelihood options (i.e., agro-processing and non-agro processing options) together with crop production.

Table 2: Diversification Status of Households

Diversification Status	Frequency	Percentage
No Diversification	49	19.6
Diversified to Agro-Processing	45	18
Diversified to Non-Agro-Processing	156	62.4
Total	250	100.0

Source: Field Survey, 2013

Results of the Multinomial Logit Regression Model: In order to establish the relative importance of different sources of livelihood, a multinomial logit model was formulated to identify factors which influence livelihood diversification. The survey results reveal that crop cultivation is the most common livelihood strategy farmers in the Upper West Region engage in. The regression model was then run with this as the base category to enable the determination of the relative effect of each specific predictor on livelihood strategies. Table 3, shows the result of multinomial logit on the relative likelihood of farmers' choosing a particular source of livelihood relative to the base category. The likelihood ratio statistics is significant at 1% level and this implies that at least one of the variables in the model has a significant influence on farmers' choice of livelihood strategy. Six (6) out of the nine (9) predictors were found to have a significant influence on household diversification to agro-processing activities while five (5) variables have a significant influence on diversification to non-agro-processing activities. Age (AGE) and membership to association (GRP) were found to have no influence on livelihood diversification.

Table 3: Multinomial Logit Regression Estimates of the factors influencing the choice of Households Diversification strategies

Variable	Diversification into Agro-processing activities			Diversification into Non-Agro-processing activities		
	Coefficient	Standard Error	P-Value	Coefficient	Standard Error	P-Value
CONS	0.9898	1.2039	0.411	2.7520	0.9065	0.002
GEN	-3.4598***	0.7082	0.00	-1.3684**	0.6134	0.026
AGE	-0.0068	0.0251	0.785	-0.0186	0.0160	0.247
EDU	0.1250*	0.0641	0.051	0.0871	0.0547	0.111
FMSIZE	-0.4996***	0.1860	0.007	-0.5244***	0.1460	0.00
HSINC	0.0002**	0.0001	0.051	0.0002***	0.0001	0.002
OBJCT	1.6701**	0.7068	0.018	0.5157	0.5001	0.302
ASSET	0.0004*	0.0002	0.059	-0.0001	0.0002	0.605
CRED	0.7834	0.5295	0.139	0.8463**	0.4069	0.038
GRP	0.0185	0.5608	0.974	-0.2615	0.4343	0.547
N= 250, LR chi2(18) = 86.08, Prob> chi^2 = 0.00, Pseudo R^2 = 0.19, Log likelihood = -187.55						

*= significant at 10%, ** = significant at 5% and *** = significant at 1%

Gender of household's head was observed to have a significant influence on livelihood diversification into both agro-processing and non-agro-processing activities. Its coefficient is negative and significant at 1% for agro-processing and 5% for non-agro-processing. This implies is male respondents are less likely to diversify their livelihood activities than their female counterparts. This result is consistent with Simtowe's (2010) and Oluwatayo (2009) that the likelihood to diversify from farming is more associated with females than their male counterparts. Similarly, the fact that men are less likely to diversify to agro-processing agrees with (Marchetta, 2011) who argue that agro-processing activities in the Upper West Region are believed to be done by women alone. A number of empirical studies (Alwang et al., 2005; Sisay, 2010; Saha &Bahal, 2010; Olale et al., 2010; Eneyew, 2012; Khatun & Roy, 2012; Asmah, 2011) explain that educational status represent household human capital endowment; an increase of which will strengthen the ability of engaging in other livelihood options. The empirical results of this study do not deviate from this observation as far as diversification to agro-processing is concerned. Thus, the coefficient of education is positive and significant at 10% for agro-processing. This implies that

households with more years spent at school are more likely to diversify their livelihood from crop cultivation to agro-processing.

Past studies maintain that larger farm sizes are often associated with specialization in agriculture. The result of this study strongly confirms this proposition. The coefficient of farm size is negative and significant at 1% for farmers' diversification into agro-processing activities. This result is somewhat consistent with Eneyew (2012) shares who found strong evidence of negative effect of farm size on livelihood diversification. Farmers with large farm sizes tend to move their objectives towards commercialization and this will invariably has a negative effect on diversification. Consistent with the above result, the study also found positive and significant effect of farmers' objective on livelihood diversification into agro-processing activities. Thus, households who produce just for subsistence will have to augment their incomes from alternative livelihoods activities. The empirical results reveal that households in this category are more likely to diversify into agro processing.

Income of households was also observed to have a significant influence on livelihood diversification. The results show that the effect of the income of households is positive and significant at 5% for agro processing activities and 1% for non-agro processing activities. These results are consistent with recent empirical studies. For instance, Simtowe (2010), and Babatunde & Qaim (2009) maintain that high income earners can easily mobilize productive resources and are more diversified than low income earners. This is true for the case of Upper West Region where factors of production are needed for all these alternative livelihoods activities. Agro processing of any kind for instance requires equipment for different activities such as processing and storage given the perishable nature of agricultural raw materials. To buttress the above point, this study also revealed that the value asset possessed has a significant and positive influence on diversification to agro processing. This result is consistent with Lay and Schüler (2008) who contend that asset-rich households are more successful at diversification. Finally, access to investment capital (credit) was found to have a significant positive effect on diversification to non-agro processing but not for agro processing. This, however, is contrary to our expectation. Thus, it was expected that access to credit would have influenced households to diversify to both categories. The effect of credit on diversification to agro processing is positive though not significant.

5. Conclusion and Recommendations

This study seeks to identify the types of agro-processing and non-agro-processing activities in the Upper West Region of Ghana and the factors influencing households' choice of diversification into each of these groups of activities as livelihood strategies using the multinomial logit regression model. Data were obtained from a survey conducted by the International Food Policy Research Institute (IFPRI) in December 2012, covering production activities for the 2011 agricultural year. The Primary data were collected from two hundred and fifty (250) food crop farmers selected using a multistage sampling procedure. The empirical results reveal that households in the Upper West Region diversify their livelihoods activities to activities of agro-processing and activities not related to agro-processing. The decision to diversify to a particular category is influenced by a number of factors. Evidence from the study suggest that households who are likely to diversify are females, they are high income earners with small farm sizes. Further, educated and asset-rich farmers who produce for subsistence only are more likely to diversify to agro-processing while access to credit will influence diversification but not necessarily to agro-processing.

The study makes the following contributions to the theoretical and empirical literature, as well as to proving insight into farmers' livelihood strategies. First, though this study is focused on Ghana, it has implications for a regional or international community, more especially for developing countries. The findings in this paper have wide range applications for developing countries with the agenda of improving farmers' livelihood strategies using agro-processing and non-agro-processing activities. Thus, the factors revealed in this study could be explored in formulating the planning strategies and implantation processes for development programs aimed at improving farmers' livelihood through diversification into agro-processing and non-agro-processing activities. Second, this study provides an empirical contribution to the existing literature. To the best of our knowledge literature on rural livelihood in the Upper West Region of Ghana exclusively concentrate on identification of livelihood outcomes but the factors influencing the choice of livelihood activities by households in the region are not explored. Hence, by identifying the types of agro-processing and non-agro-processing activities in the

Upper West Region of Ghana and the factors significantly influencing households' choice of diversification as livelihood strategies, this study provides an empirical contribution to the existing literature.

Third, given the general factors in the Upper West Region, the use of the Multinomial Logit Regression Model to examine the factors significantly influencing households' choice of diversification into agro-processing and non-agro-processing activities as livelihood strategies provides a theoretical contribution to the existing literature. The managerial implications and recommendations of the study are as follows. First, the proponents of agro industrial development in Ghana should intensify and implement educational campaigns and assist farmers to acquire assets since they are the determinants of diversification to agro-processing. Second, women should be the main target for agro industrial development programs in the study area as they have the potential to diversify than their male counterparts.

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