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Analysis of Agricultural Students in Sub-Saharan Africa Venturing into Self-employed Agribusinesses: Empirical Evidence from the University of Ghana

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Abstract

Agribusinesses are an essential part of Sub-Saharan African (SSA) economies. Skilled human resource is however required for the creation and sustainable growth of these agribusinesses. This study uses data collected on final year agricultural students of the University of Ghana to analyze the likelihood of agricultural students venturing into self-employed agribusinesses. We also look into the factors that influence this likelihood as well as the forms of agribusinesses that students are likely to venture into. We find that, there is 84 percent probability that an agricultural student would venture into an agribusiness. The probability that an agricultural student would venture into an agribusiness is higher for male students. Also, the probability that a student would venture into an agribusiness is higher for students who perceive agribusinesses to be prestigious and profitable. We find that students are more likely to venture into forms of agribusinesses related to subjects in which they receive the highest levels of training. This study is important for informing educational policy decisions as well as ways to incentivize more agricultural students to venture into sustainable agribusinesses.

Keywords: Agribusiness, venture, sustainable, policies, likelihood, economy

Introduction and Motivation

For every economy to grow there must be progressive development in its economic activities and business environment. The key to this is not only providing the enabling environment such as putting in the right regulations to foster this kind of growth, but also in training and use of skilled human resource (ILO, 2010). Thus, economies that are fueled by growth in the pharmaceutical industry for instance would invest in training more pharmacists and harness their skills for the development of their economies. In Sub-Saharan Africa, agriculture and its related businesses employ 65 percent of the labor force and account for 32 percent of gross domestic product (World Bank Report, 2008). It is therefore important that greater investment would be made in training of agricultural experts who would use their learned skills for the advancement of the agricultural industry in Sub-Saharan Africa. This will create an environment for economic growth in the region (Becker 1962, 1964).

Some efforts have been made in creating this skilled labor force in Sub-Saharan Africa, such as the introduction of youth in agriculture programs and the provision of scholarships to students to pursue agricultural related programs in tertiary institutions. These have been the main strategies for creating the needed human resource for advancement of the agricultural industry in this region. These efforts have however not translated into the needed growth anticipated by various stakeholders such as governments and non-governmental organizations who have invested in training human resource (AGRA Report, 2015). The agricultural industry is a sector where job creation is key for its expansion, and it is expected that individuals who have been trained in this field would take up creating businesses related to agriculture; providing jobs for themselves and for others in a region where youth unemployment is at a high 11.6 percent (ILO, 2015). It is therefore important to ascertain whether agricultural students would like to venture into self-

employed agribusinesses or not, what influences their likelihood to venture into agribusinesses, and the forms of agribusinesses they are likely to venture. If these issues are addressed, stakeholders (governments and non-governmental organizations) would be in better positions to direct their efforts and investments to areas which would produce the best results for economic growth in Sub-Saharan Africa through the creation of agribusinesses by individuals who have the best learned skills in the field of agriculture.

Background of the Agribusiness Sector in Ghana

Few African countries have been able to capitalize on the potential role of agriculture to contribute to economic development through the modernization of farming and its related businesses (World Bank Report, 2012). Ghana's domestic agricultural production is below its current demand. The country's level of self-sufficiency in food items is 50 percent for meat products, 60 percent for fish consumption, 30 percent for rice, 92 percent for maize and less than 30 percent for raw materials needed for agro-based industries (MoFA, 2010, 2012). These statistics are very disturbing since reports by OECD (2010) show that over 20 percent of gross domestic product (GDP) and two-thirds of agricultural GDP in Ghana are staple crops and livestock production.

The agricultural sector is a major source of employment in Ghana, providing direct and indirect jobs to about 80 percent of the nation's work force MoFA (2012). The largest portion of this labor force are rural dwellers who have limited or no formal education (FAO, 2010). Agricultural production is usually rain fed with little or no improved technology, and on subsistence levels (McKay and Aryeetey, 2004).

The Role of Education on Agriculture Development

Faculties of agriculture and agricultural colleges and universities were first formed in the belief that farm production could be increased as a result of the systematic application of current technology and agricultural research findings (Jamaluddin and Alias, 1997). The mission of these early educational institutions was to scientifically study agriculture with the participation of the farming community; to carry the results to a broad range of farmers who could use them; and to train farmers, extension workers, agricultural teachers and researchers so that there would be sustainable development in agricultural production (Johnson, 1996). Intermediate and higher education in agriculture continues to play a decisive role in rural development and sustainable agricultural production. An increasingly interdependent world however is producing new challenges for institutions where agriculture is taught (Kabir, 1995). Over the years, the world has changed and in many developing countries, agricultural education and training have failed to adapt and respond to the realities of rural societies (Mitchell, 1998).

Curricula and teaching methods and tools often have been developed that are not relevant to the development objectives of individual countries, to the needs of farmers and to the labor market in general (World Bank, 2002). The situation has further deteriorated as a result of economic crises. In many developing countries, the public sector used to absorb the large majority of agricultural graduates. This is no longer the case. Agriculture graduates are finding it increasingly difficult to become employed. Their education in agriculture has not been oriented to the needs of an increasingly sophisticated commercial sector (Tilak, 2002).

Data and Methods

The study area is the University of Ghana, College of Agriculture and Consumer Sciences. It is located in the Greater Accra Region, specifically Legon, about twelve kilometres northeast of the center of Accra. It is the oldest of the thirteen Ghanaian public universities.

The stratified random sampling technique was employed to collect data for the study. The stratified random sampling technique is a probability sampling technique that involves the division of a population into smaller groups known as strata. In stratified sampling, the strata are formed based on members' shared attributes or characteristics. All final year students of the College of Agriculture of the University of Ghana who were closest to graduating; and were assumed to be capable of making informed choices about the study were therefore sampled. This was followed by the selection of students at the bachelors and masters levels. The third stage involved random sampling of 80 bachelors' level students out of 167 students and 25 masters' level students out of 43 students. A total of 105 students were interviewed out of a total number of 210 students in the levels stated.

Primary data were collected on the students by administering structured questionnaires. Data collected on students included socio-economic characteristics as well as other relevant information that were needed based on the objectives of the study.

Descriptive statistics such as tables, graphs, percentages, etc. were used to analyze socio-economic data. The logit regression analysis was employed to determine factors that would influence the likelihood that a student would venture into an agribusiness. Also, the Kendall's coefficient of concordance (W) was used to test for agreement between ranks for various levels of training in agriculture and its related fields as perceived by students.

The Logit Regression Model

We estimate the logit model using the maximum likelihood technique. We assume error terms to be independently and identically distributed following a Gumbel (type 1 extreme value) distribution. This assumption allows for the specification of a logit model (Greene, 2012);

$$P_i(I=1|x_j) = \frac{e^{x_j\beta}}{1+e^{x_j\beta}} = \Lambda(x_j\beta) \quad (1)$$

where I is a discrete indicator variable (venture or not venture). The x -variables include an indicator variable that takes the value of 1 if the student thinks that agribusiness ventures are prestigious; an indicator variable that takes the value of 1 if the student thinks that agribusiness ventures are profitable, an indicator variable that takes the value of 1 if the student thinks that there is easy access to capital for agribusiness ventures ; an indicator variable that takes the value of 1 if the student thinks that agribusiness has policy support from government; an indicator variable that takes the value of 1 if the student thinks that agribusiness has extension service support from government; an indicator variable that takes the value of 1 if the student resides in an urban area; an indicator variable that takes the value of 1 if the student thinks that agribusinesses are dependent on reliability of rainfall; an indicator variable that takes the value of 1 if the student is male, β are the parameters to be estimated.

Marginal effects for the explanatory variables are calculated as the mean of the marginal effect for each observation with the latter calculated using:

$$\frac{\partial E(I|x_j)}{\partial x_{ij}} = \Pr[I=1|x_{ij(d)}, d=1] - \Pr[I=1|x_{ij(d)}, d=0] \quad (3)$$

where d is the discrete variable and the marginal effect is calculated at $d=1$ and $d=0$ for each observation. The two series of marginal effects are averaged and the difference between the averages are reported (Greene, 2012).

Hypothesis Statements

H_0 : Gender has no effect on the likelihood that an agricultural student would venture into an agribusiness.

H_A : Gender has a significant effect on the likelihood that an agricultural student would venture into an agribusiness.

where H_0 and H_A denote null and alternate hypotheses respectively.

The above hypotheses are repeated for; access to capital, policy support from government, profitability of agribusiness ventures, prestige of agribusiness ventures, extension support from government, place of residence of student and reliability of rainfall.

Ranking of Level of Training

The Kendall's coefficient of concordance (W) was used to test for agreement between ranks for various levels of training in agriculture and its related fields as perceived by students. The coefficient, W is an index that measures the ratio of the observed variance of the sum of ranks to the maximum possible variance of sum ranks.

Possible responses to the level of training received in each field of study were presented to respondents in Likert scale format with the lowest rank of training being 1 and the highest 5. The rankings by the respondents were collated and the mean ranks of the ranked categories were computed. The field of study with the least mean rank is ranked the field with the least level of training and the one with the highest mean rank is ranked the field with the highest level of training. The Kendall's coefficient of concordance was used to identify the agreement among the ranking by respondents.

Model Specification

Following Legendre (2005) the formula for the coefficient of concordance is given by;

$$W = \frac{12S}{p^2(n^3 - n) - pT} \quad (4)$$

where T denotes correction factor for tied ranks, p denotes number of variables, S is a sum-of-squares statistic over the row sums of ranks, n denotes number of categories being ranked.

Statement of Hypothesis

H_0 : There is no agreement among the ranking of the level of training in various fields of study by the respondents.

H_A : There is agreement among the ranking of the level of training in various fields of study by the respondents.

Validation of Hypothesis

The F-ratio test was used to test for significance of the coefficient of concordance (W) is given as;

$$F-ratio = \left[(p-1)W / (1-W) \right] \quad (5)$$

where W is the calculated Kendall's coefficient of concordance from equation 4. The Kendall's coefficient of concordance is a non-parametric statistic. It is a normalization of the statistic of the Friedman test and is used for assessing agreement among raters. The Kendall's W value ranges from 0 (no agreement) to 1 (complete agreement) (Corder et al, 2009).

The advantage the Kendall's concordance coefficient has over the Pearson correlation coefficient is that while the Pearson correlation coefficient assumes normally distributed values and compares two sequences of outcomes at a time, the Kendall's concordance coefficient makes

no assumption concerning the nature of the probability distribution and can handle any number of distinct outcomes (Legendre, 2005).

Results

Descriptive Statistics

The socioeconomic characteristics examined include: age, gender, size, marital status, religious affiliation, educational level, ethnicity, and place of residence of respondents.

Age of students: The majority of respondents were between the ages of 21 and 25, with a modal age of 22 years. The mean age was 24 years and the minimum and maximum ages were 21 years and 36 years respectively. This implies that all the prospective students who are likely to venture into agribusinesses are in their youthful ages.

Gender of respondents: Eighty-eight (88) respondents representing 84 percent were males and 16 percent were females. This gives an indication that majority of agricultural students are males and that the study of agriculture is a male dominated field at the University of Ghana.

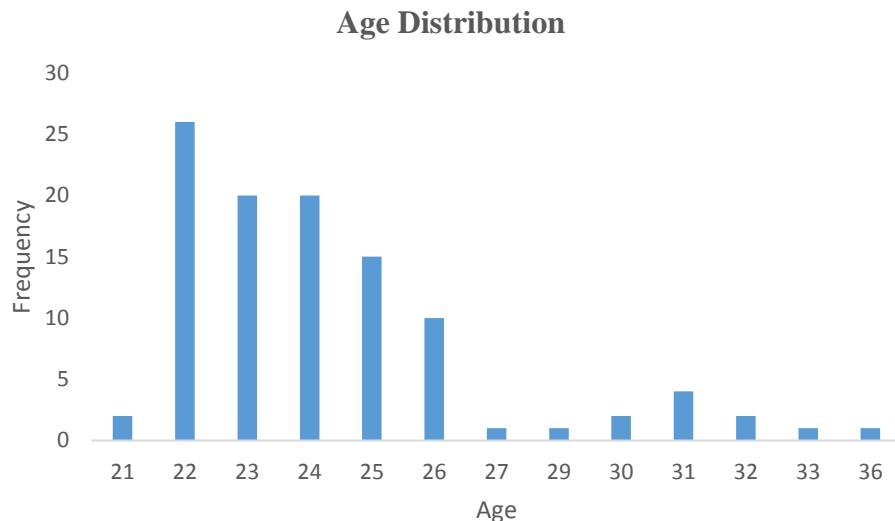
Marital status of respondents: Ninety-eight (98) of the respondents representing 93 percent were unmarried while seven (7) of the respondents representing 7 percent were married.

Religious affiliation of respondents: Ninety-six (96) respondents representing 91 percent were Christians and nine (9) respondents representing 9 percent were Muslims.

Educational level of respondents: Eighty (80) respondents representing 76 percent were undergraduate students and twenty-five (25) respondents representing 24 percent were master students.

Ethnicity of respondents: Akans form a majority of respondents with a representation of 48 percent whiles Guans had the least representation of 3 percent.

Place of residence of respondents: Eighty-seven (87) respondents representing 83 percent lived in urban areas while eighteen (18) of the respondents representing 17 percent lived in rural areas. This could be due to the location of the university.



Source: Survey Data January, 2013

Logistic Regression Results

The findings from the study showed that the likelihood of agricultural students to venture into self-employed agribusiness is 84 percent. Out of a total number of 105 respondents 88 of them indicated they would like to venture into self-employed agribusinesses.

Table 1: Factors that affect likelihood to venture

Independent Variable	Parameters	z-value	p>/z/	Marginal effect
Prestige	1.133**	2.37	0.018	0.038
Profitability	1.921***	2.81	0.005	0.065
Access to capital	0.814	1.49	0.136	
Government policies	0.501	0.94	0.330	
Extension services	-0.720	-1.39	0.163	
Place of residence	0.092	0.24	0.809	
Rainfall	0.342	0.63	0.529	
Gender	1.790**	2.31	0.021	0.012
Constant	-10.563	-2.80	0.005	
Number of observation	105			
LR chi-sq (9)	37.80			
Prob>chi-sq	0.0000			
Pseudo R-sq	0.4065			

Notes: Regression results for factors that influence the likelihood to venture into an agribusiness. **, and *** denote significance at 5%, and 1% levels. *Source: Survey Data January, 2013.*

The gender of respondents, respondents' view of prestige of agribusinesses and their perception about the profitability of agribusinesses are significant variables in determining their likelihood to venture into agribusinesses.

The marginal effect of gender shows that the probability that a student ventures into an agribusiness is higher by 1.2 percent for male students than for females. Also the marginal effect of prestige of agribusiness ventures shows that the probability that a student would venture into an agribusiness is higher by 3.8 percent for students who perceive agribusinesses to be prestigious than for those who do not. The marginal effect of profitability of agribusiness ventures shows that the probability that a student would venture into an agribusiness is higher by 6.5 percent for students who perceive agribusinesses to be profitable than for those who do not.

Perceived level of training received by students

Table 2: Level of Training

Field of Study	Mean	Ranking
Practical agricultural mechanisation	2.4231	1
Theoretical agricultural mechanisation	2.7212	2
Practical soil science	2.8269	3
Practical entrepreneurial skills	2.8942	4
Practical agribusiness and economics	2.9423	5
Practical animal production	3.0000	6
Theoretical soil science	3.1058	7
Practical crop science	3.1250	8
Theoretical entrepreneurial skills	3.2692	9
Theoretical animal production	3.2981	10
Theoretical agribusiness and economics	3.3712	11
Theoretical crop production	3.3942	12
Number of observation	105	
Kendall's W	0.091	
Asymp. Significance	0.000	
Chi-square	104.373	

Source: Survey Data January, 2013

Students perceive that they are getting the least level of training in practical agricultural mechanisation. This is a source of great concern considering that agriculture is moving towards a more progressive technologically based and mechanised system. Also, most practical fields of study had the minimum rankings, showing that students are not getting very high training in these various fields and this is likely to affect their likelihood to venture into agribusinesses because agriculture is a practical based science.

Students are receiving relatively high levels of training in theoretical fields of study, with theoretical crop science being the field in which students are receiving the highest level of training; this could explain why most students who indicated they would like to venture into agribusinesses also indicated they would venture into crop production. The Kendall's W of 0.091 shows that there is little agreement between ranks.

Forms of Agribusinesses which Students are likely to Venture

Crop Production: Forty- seven students representing 53 percent of the total number of respondents who indicated they would like to venture into agribusinesses are likely to go into crop production. This represents the majority of total number of students who are likely to venture into agribusinesses of any form. Out of the forty-seven respondents who are likely to venture into crop production; the majority of them that is; sixteen of them are likely to go into cocoa production representing 34 percent of the total number of students who are likely to go into crop production. Fifteen students representing 32 percent of the total number of students who would like to venture into crop production are likely to go into the production of cereals; such as maize, rice, and millet. Fourteen students representing 29 percent of the total number of students who would like to venture into crop production are likely to go into the production of vegetables such cabbage, lettuce, and carrots. Two students representing 5 percent of the total number of students who would like to venture into crop production are likely to go into the production of other tree crops such as mango and oil palm.

Animal production: Twenty-five students representing 28 percent of the total number of respondents who indicated they would like to venture into agribusinesses are likely to go into animal production. This represents the second highest number of students who are likely to venture into agribusinesses of any form. Out of the twenty-five respondents who are likely to venture into animal production; the majority of them, that is eleven respondents representing 44 percent of the total number of students who are likely to venture into animal production, are likely to go into ruminant production; cattle, goat and sheep. Eight students representing 32 percent of the total number of respondents who would like to venture into animal production are likely to go into

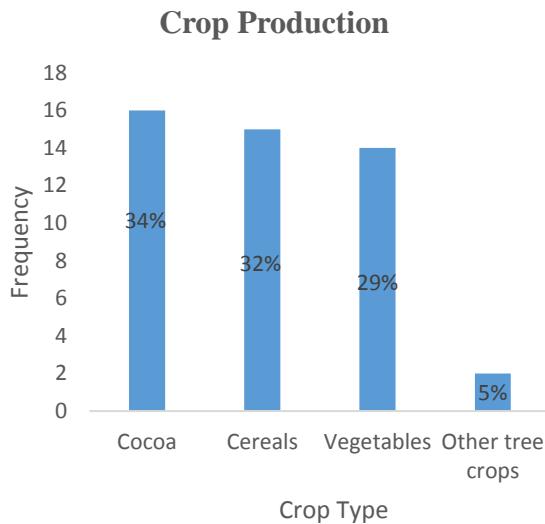
poultry production. Six students representing 24 percent of the total number of respondents who would like to venture into animal production are likely to go into pig production.

Other Forms of Agribusinesses: Apart from the traditional agribusinesses; which include crop production and animal production, there are other forms of agribusinesses such as; food processing, fish farming, input/agrochemical supply, agricultural consultancy and the storage and distribution of agricultural products. Sixteen students representing 19 percent of the total number of respondents who indicated they would like to venture into agribusinesses are likely to go into other forms of agribusinesses that are non-traditional. Out of the sixteen respondents who are likely to venture into non-traditional forms of agribusinesses; the majority of them that is; six of them are likely to go into food processing such as; fruit juice processing, meat processing and fish processing, representing 37 percent of the total number of students who are likely to venture into non-traditional forms of agribusinesses. Three students representing 19 percent of the total number of students who would like to venture into non-traditional forms of agribusinesses are likely to go into each of the following; fish farming, input/agrochemical supply and agricultural; equaling a total of twelve students and a representation of 57 percent of the total number of students likely to venture into non-traditional forms of agriculture. One student representing 6 percent of the total number of students who are likely to venture into non-traditional forms of agribusinesses is likely to go into the storage and distribution of agricultural products such as; grains and tubers.

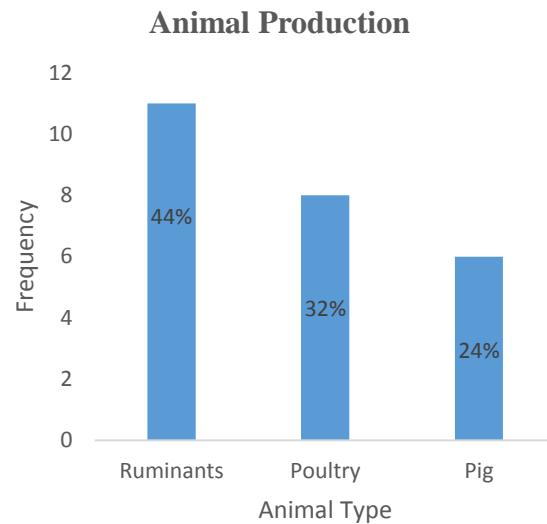
Non-agribusinesses which Students are likely to Venture

Four students representing 24 percent of the total number of respondents who indicated they would not like to venture into any form of agribusiness are likely to go into fashion design. Three students representing 18 percent of the total number of respondents who indicated they would not like to venture into any form of agribusiness are likely to go into real estate development.

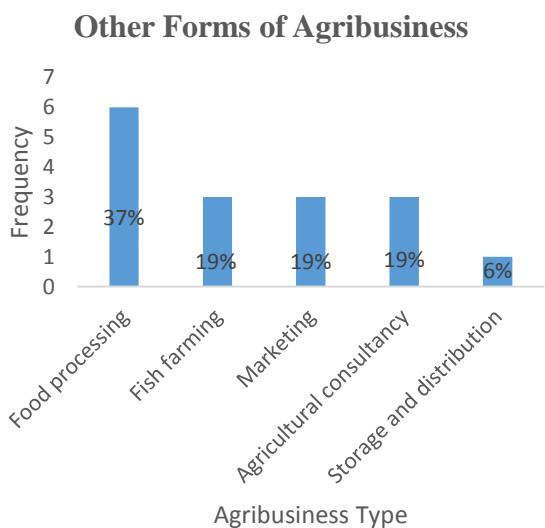
Ten students representing 58 percent of the total number of respondents who indicated they would not like to venture into agribusinesses are likely to into non- agribusinesses such as; transport, waste management, marketing of non-agricultural based products, health, among others.



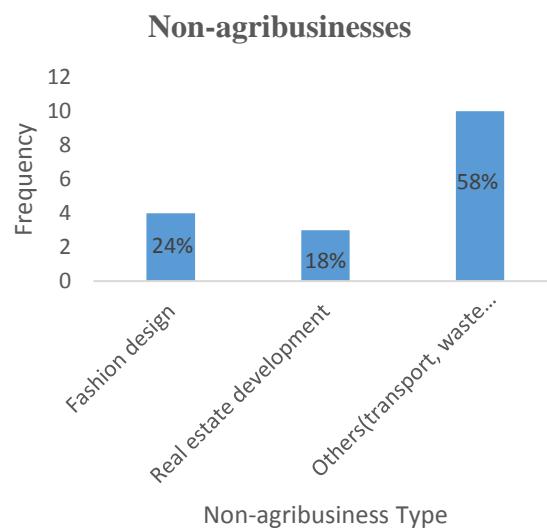
Source: Survey Data January, 2013



Source: Survey Data January, 2013



Source: Survey Data January, 2013



Source: Survey Data January, 2013

Conclusion and Recommendations

The likelihood of agricultural students to venture into self-employed agribusinesses is dependent on whether they perceive agribusinesses to be profitable or not; prestigious or not; and the gender of the student. Students perceive that they are getting the least level of training in practical sciences, especially practical agricultural mechanisation. Students are however getting relatively significant levels of training in theoretical sciences especially theoretical crop science. This could be associated to the finding that majority of students are likely to venture into crop production.

Based on the findings, it is recommended that policies should be designed to make agribusinesses more attractive for the youth especially agricultural students to want to venture into. More females should be incentivized to take up self-employed agribusinesses. Also, more training should be given to students in practical sciences, especially agricultural mechanisation. Agriculture is moving towards a more modern, technologically based form; it is therefore very important that students who would want to venture into agribusinesses are given the needed training that would adequately prepare them to venture into very successful agribusinesses.

While the scope of this study is limited to the University of Ghana, Legon; it will be interesting to extend the study to cover other tertiary institutions in Ghana as well as other Sub-Saharan African countries.

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