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Research Article

Factors Affecting Farmers' Intention to Use Rhizobium Inoculant Technology in the Northern Region, Ghana

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This study was done in the Northern Region of Ghana (Tolon and Savelegu) in the 2017. Primary data on factors that affect farmers' intention to use rhizobium inoculant technology were collected among 210 respondents using questionnaires. Secondary data was also obtained from SARI, IITA as well as IFDC offices respectively. Theory of Planed Behaviour model was employed to assess factors that affect farmers' intention to use rhizobium inoculant technology and the data analysed using multiples linear regression, Pearson correlation and frequencies and percentage. Overall, 74.3% of farmers are willing to use rhizobium inoculants for their farming operation in the Northern Region of Ghana. This suggest that farmers would buy rhizobium inoculant if made available to them at the community level. Furthermore, considering the variables in Theory of Planed Behaviour, which influences farmers' intention to use rhizobium inoculant, promoters of the technology as well as extension had a significant influence on farmers' decision to use. Though, farmer themselves could not influence their colleague since, there equally lack adequate knowledge on the technology.

Keywords: Intention to Use, Rhizobium Inoculant, Attitude (A), Subjective Norms (SN) and Perceived Behavioral Control (PBC)

INTRODUCTION

The agricultural sector faces a challenge of poor soil fertility and food insecurity in Africa (Sanginga and Woomer 2009), with high cost of inorganic fertilizer (Ndakidemi *et al*. 2006) and poor economic status of most smallholder farmers. Farmers in Africa are unable to afford the high cost of inorganic fertility. In view of this, agricultural researchers have developed rhizobium inoculants as a cheaper substitute of improving low soil fertility (Giller, 2001), as well as boosting yield of soybeans, (IITA, 2009).

The use of rhizobium inoculants has been an effective agronomic practice for ensuring adequate N-nutrition of legumes, compared with the application of N-fertilizer (Paynel *et al*. 2008), the use of rhizobium inoculant boosts legumes production and improves soil fertility at a cheaper cost, (Bala *et al*. 2011). Notwithstanding its potential to addressing low Nitrogen in soil and its cost effectiveness, adoption of rhizobium inoculants by farmers still remains low (Dogbe *et al*. 2013). Thus, Ghana is still far from realizing wide-scale usage of rhizobium inoculant among farmers.

Several factors are known to influence farmers' intention to use and adoption of agricultural technologies. These factors include: 1) Availability, 2) affordability of technologies and 3) Farmer expectations on the technology, that adoption will remain profitable, (Carletto, Kirk and Winters. 2007: Foster and Rosenzweig, 2010). Though, some factors are expected to drive these factors, these include; farm size, family labour, prices and profitability of agricultural enterprises, and peer effects. On the order hand, agricultural technology adoption, is peer effects or learning from other farmers. According to Oster and Thorton (2009), in any technology adoption process, peer effects work in three major ways: (1) individuals profit from acting like friends/neighbours; (2) individuals gain knowledge of the benefits of the technology from their friends; and (3) individuals learn about how to use a new

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approach from peers. With regard to agricultural technology adoption, peer effects can lead to economies of scale by lowering transportation costs but can also lead to increased competition and land prices, which can spur dis-adoption (Carletto *et al*. 2007). Additionally, socioeconomic characteristics like age, education level, marital status, farm size, farm income and off-farm income all affects farmers' intention to use agricultural technologies, (Akinola and Owombo, 2012).

METHODOLOGY

This study was done in two districts of the Northern Region of Ghana (Tolon and Savelegu). Primary data on factors that affect farmers' intention to use rhizobium inoculant technology were collected among 210 respondents using questionnaires based on Theory of Planed Behaviour construct. Secondary data was also obtained from SARI, IITA as well as IFDC offices respectively and the data analysed using multiples linear regression, Pearson correlation and frequencies and percentage. The survey employed simple random sampling techniques in selecting the sample for the study, two (2) districts were targeted for the study, and these districts are Tolon and Savelugu respectively. The selection is because of the operations of Savannah Agricultural Research Institute (SARI) in collaboration of International Fertilizer Development Center (IFDC) and International Institute of Tropical Agriculture (IITA) were found to be the dominant institutions promoting rhizobium inoculant usage among farmers in these districts. Six communities were randomly selected from Savelugu municipal and Tolon district respectively. The sampled communities from Tolon district were Chirifoyili, Gbulahagu and Nyankpala. Whiles, from Savelugu Municipal were Kpung, Dipale and Gushie. From the list of legume farmers from each community sampled, the lottery method of random sampling technique was used to sample 35 legume farmers from each of the six communities to form a sample size of 210 in the Northern Region of Ghana.

The Concept of Theory of Planed Behaviour

The theory of planned behaviour (Ajzen, 1985; 1991) is an extension of the theory of reasoned action (Ajzen and Fishbein, 1980). While the TRA seeks to explain behaviour through behavioural intent based on attitude and subjective norms, the TPB addresses the issue of imperfect volitional control over the behaviour in question and consequently adds another component, that of perceived behavioural control. Intention to perform the behaviour is the central factor as it is the immediate originator of any behaviour. The stronger the intention to perform the behaviour, the more likely should be its performance.

In this context, attitudes are determined by accessible beliefs about the outcomes of the behaviour and by the evaluation of this particular outcome. Following the expectancy-value model (Fishbein and Ajzen, 1975) a belief-based measure of the attitude (A) is obtained by multiplying belief strengths (bs) and outcome evaluation (oe) and summing the products according to:

$A \propto \sum bsi \times oei$……………………………………………..1

Belief strength is explained as the subjective probability that a given behaviour will produce a certain outcome (Fishbein and Ajzen, 1975) and the outcome evaluation can be regarded as the utility received of that outcome occurring.

In the same way, measures for the other components are obtained. Subjective norm (SN) results from multiplying strength of normative belief (nb) with motivation to comply (mc) and summing the results following.

$SN \propto \sum nbi \times mci$……………………………………………..2

Finally, perceived behavioural control (PBC) is obtained by multiplying control belief strength (cb) with power of control (pc) and summing the results by applying.

$PBC \propto \sum cbi \times pci$……………………………………………..3

Thus, all components that measure behavioural intent consist of direct as well as belief-based measures following the expectancy-value model.

To validate the model, the belief-based measures should correlate well with the global measure of the specific component (Ajzen, 1991). This reveals salient beliefs, which are then used for further analysis.
Based on the three components of the TPB that are derived following the expectancy-value model, the model to explain the behavioural intention BI becomes:

$BI = \beta 1A + \beta 2SN + \beta 3PBC + \epsilon$…………………………4

Where β are empirically determined weights to estimate the importance of each component and ϵ is an error term. Depending on the context and the farmers, the influence of attitude toward the behaviour, subjective norm and perceived behavioural control on behavioural intention to use inoculant can vary. In general, the more positive the attitude, subjective norm and perceived behavioural control the more likely the farmer is to use inoculant. However, due to social consequences and not having full control over the implementation, attempting to perform the behaviour may not necessarily lead to actual performance of the behaviour. The analysis in this study will show how these components influence the intention of farmers to use rhizobium inoculant for their farm operations.

RESULTS AND DISCUSSION

Demographic Profile of Farmers

The survey results (table 1) show that majority of legume farmers (73.3 %) were males; with 26.7 percent of legume farmers being females. Although females form the least group in the survey, they play several roles such as planting, harvesting, shelling of legumes etc. However, much of what the women do on the farm is, mostly considered as family labour and this could account for the small number of female farmers (26.7%) in the study area. On age of respondents, the results revealed that, 23.8 percent of the farmers were below the age 30, with 5.7 percent being above 60 years. However, 37.6 percent of farmers were between 30 and 45 years, whiles 32.9% of the respondents were between the age 46 and 60 (table 1) as seen the table below. The analysis on marital status of respondents indicates that, majority of farmers (78.1%) interviewed were married, while very few (5.2%) are single (never married) and 10 percent and 6.7 percent divorcees and windows respectively. With educational status of respondents, few farmers had Junior High education (9.0%), primary education were 25.2 percent and 12.4 percent had secondary education. However, 53.3 percent had no-formal education. With, none of the respondent having tertiary. These results indicate that majority of the farmers were illiterates with no formal education. Though, Higher education status of a farmer increases their ability to process and use information disseminated to them on agricultural innovation (Lavison, 2013).

However, in line with the findings, it might be difficult for illiterate's farmers to properly understand information disseminated to them by promoters of rhizobium inoculant in order to make proper judgment on whether to adopt or not. With regard to farming experience, the results show that, 19.5 percent of the respondents had less than 5 years' experience of legume production, with 28.1% had between 5-10 years' experience of legume production and 52.4 percent had more than 10 years' experience of legume production. Some researchers suggest that experience in a particular is relevant in achieving results over time, (Fiedler, 2007; McCall *et al*. 2004). Thus, this suggests that since, most legume farmers had a much farming experience in legume production, adoption of rhizobium inoculant is likely to occur after these projects are over.

Table 1: Demographic Profile of Farmers

Characteristics	Farmers	
	Frequency	Percentage
Gender:		
Male	154	73.3
Female	56	26.7
Age:		
Below 30	50	23.8
30-45	79	37.6
46-60	69	32.9
Above 60	12	5.7
Marital Status:		
Married	164	78.1
Single	11	5.2
Divorced	21	10.0
Widowed	14	6.7
Educational level:		
No education	112	53.3
Primary school	53	25.2
Junior high school	19	9.0
Secondary/vocational institute	26	12.4
Farming Experience:		
Less than 5 years ago	41	19.5
5-10 years ago	59	28.1
More than 10 years ago	110	52.4
Total	**210**	**100.0**

Source: Field Survey Data, 2017

Relationship between Age and Uptake of Rhizobium Inoculant

Table 2 shows the relationship between the educational level of respondents and their using of rhizobium inoculant. Majority of respondents (69) between the ages of 20-45 years are using rhizobium inoculant, (54) respondents between the ages of 46-60 years are using rhizobium inoculant, (45) respondent below 30 years are using rhizobium inoculant as compared to (10) respondent above 60 years are using rhizobium inoculant.

When subjected to the chi square test, the chi square statistics (X^2 =3.746 p=0.290) at 5% confidence level shows that the relationship between age of respondents and using of rhizobium inoculant is not significant. It therefore suggests that usage of rhizobium inoculant is not dependent on age of respondents, as reported by p-value of 0.290.

Table 2: Relationship between Age and Farmers Uptake of Rhizobium Inoculant

Age of Respondents	Usage of Inoculant		Total
	Using	Not Using	
Below 30 Frequency	45	5	50
30-45 Frequency	69	10	79
46-60 Frequency	54	15	69
Above 60 Frequency	10	2	12
Total	178	32	210

Source: Field Survey Data, 2017

(X^2 =3.746p=0.290) Not significant

Relationship between Sex and Uptake of Rhizobium Inoculant

From table 3, majority of respondents (130) who are males are using rhizobium inoculant as compared to (48) of respondents representing females are using rhizobium inoculant.

When subjected to the chi square test, the chi square statistics (X^2 =.054 p=0.817) at 5% confidence level shows that the relationship between sex of respondents and usage of rhizobium inoculant is not significant. It therefore means that usage of rhizobium inoculant is not dependent on sex of respondents.

Table 3: Relationship between Sex and Farmers Uptake of Rhizobium Inoculant

Sex of Respondents	Usage of Inoculant		Total
	Using	Not Using	
Male Frequency	130	24	154
Female Frequency	48	8	56
Total	178	32	210

Source: Field Survey Data, 2017

(X^2 =.054p=0.817) Not significant

Relationship between Educational Level and Farmers Uptake of Rhizobium Inoculant

Table 4 shows the relationship between the educational level of respondents and their usage of rhizobium inoculant. Majority of respondents (95) who had no formal education are using rhizobium inoculant, (24) respondents with secondary education are using rhizobium inoculant, (43) respondent with primary education are using rhizobium inoculant while (16) respondent with junior high education are using rhizobium inoculant.

When subjected to the chi square test, the chi square statistics (X^2 =1.692 p=0.639) at 5% confidence level shows that the relationship between educational level of respondents and usage of rhizobium inoculant is not significant. Thus, this implies that usage of rhizobium inoculant is not dependent on educational level of respondents

Table 4: Relationship between Educational Level and Farmers Uptake of Rhizobium Inoculant

Educational Level	Usage of Inoculant		Total
	Using	Not Using	
No formal education Frequency	95	17	112
Primary school Frequency	43	10	53
Junior high school Frequency	16	3	19
Secondary/vocational institute Frequency	24	2	26
Total	178	32	210

Source: Field Survey Data, 2017

(X^2 =1.692p=0.639) Not significant

Relationship between Marital Status and Farmers Uptake of Rhizobium Inoculant

Table 5 shows the relationship between the marital status of respondents and their usage of rhizobium inoculant. Majority of respondents (140) who are married are using rhizobium inoculant, (18) respondents who are divorced are using rhizobium inoculant, (9) respondent who were single are using rhizobium inoculant while (11) respondent who are widowed are using rhizobium inoculant.

When subjected to the chi square test, the chi square statistics (X2 =.550 p=0.908) at 5% confidence level shows that the relationship between marital status of respondents and usage of rhizobium inoculant is not significant. Thus, this implies that usage of rhizobium inoculant is not dependent on marital status of respondents as seen in the table below.

Table 5: Relationship between Marital Status and Farmers Uptake of Rhizobium Inoculant

Marital Status	Usage of Inoculant		Total
	Using	Not Using	
Married Frequency	140	24	164
Single Frequency	9	2	11
Divorced Frequency	18	3	21
Widowed Frequency	11	3	14
Total	178	32	210

Source: Field Survey Data, 2017

(X^2 =.550p=0.908) Not significant

Relationship between Farming Experience and Farmers Uptake of Rhizobium Inoculant

Table 6 shows the relationship between the farming experience of respondents and their using of rhizobium inoculant. Majority of respondents (89) who had more than 10 years of farming experience are using rhizobium inoculant, (52) respondents who had between 5-10 years' of farming experience are using rhizobium inoculant and (37) respondent who had less than 5 years' of farming experience are using rhizobium inoculant.

When subjected to the chi square test, the chi square statistics (X^2 =2.738 p=0.254) at 5% confidence level shows that the relationship between farming experience of respondents and usage of rhizobium inoculant is not significant. Thus, this implies that usage of rhizobium inoculant is not dependent on farming experience of respondents

Table 6: Relationship between Farming Experience and Farmers Uptake of Rhizobium Inoculant

Farming Experience	Usage of Inoculant		Total
	Using	Not Using	
Less than 5 years ago Frequency	37	4	41
5-10 years ago Frequency	52	7	59
More than 10 years ago Frequency	89	21	110
Total	178	32	210

Source: Field Survey Data, 2017
(X^2 =2.738p=0.254) Not significant

Farmers' Behavior, attitude and Intention to Use Rhizobium Inoculant

The average values of the Theory of Planed Behaviour components were calculated. Table 7 below presents the means, and standard deviations for these variables. As shown in the table 7, farmers' attitude towards the use of use rhizobium inoculant was below average of the items. A mean score of 2.20 (Mean = 2.20, Standard Deviation= .704) was reported for this variable.

As indicated by subjective norms, it is clear that farmers perceived a moderate social pressure to use rhizobium inoculant in their farming operation (Mean= 2.42, Standard Deviation = .640). However, results revealed that farmers' perception on power of control beliefs was almost moderate.

In other words, farmers' perception of their control over money and farmland and evaluations of the extent to which these resources constrain their use of rhizobium inoculant, was strong suggesting that farmers perceived use of rhizobium inoculant as being under their control. This perception was supported by a relatively higher mean score for perceived behavioural control (Mean= 3.48, Standard Deviation = .650).

Table 7: Descriptive Analysis of the Theoretical Variables of the Model (N=210)

Variables	Mean	Std. Deviation
Intention	3.44	.500
Attitudes	2.20	.704
Subjective Norms	2.42	.640
Perceived Behavioural Control	3.48	.650

Behavioral Intention to Use Rhizobium Inoculant and Attitude, Subjective Norm and Perceived Behavioral Control

The correlations between the dependent and independent variables, in the multiple regression shows that intention was positive and significantly correlated with Attitudes at 5.0% significant level. This implies that farmers' intention to rhizobium inoculant is positively affected by their attitude. This finding is in line with Ajzen (2006), Theory of Planed Behaviour, that a positive attitude towards an act will influence ones intention to use rhizobium inoculant.

On the other hand, farmers' attitude was negative and significantly correlated with PBC at 5.0% significant level. Thus, the attitudes of farmers towards rhizobium inoculant are likely to be affected by the challenges there encounter with rhizobium inoculant used. Moreover, Subjective Normswas positive and significantly correlated with PBC at 5.0% significant level.

Finally, PBC was negative and significantly correlated with attitude and Subjective Norms at 10.0% significant level and 1% significant level respectively. Although some of the independent variables were significantly correlated with each other for instance.

PBC was significantly correlated to both attitude and Subjective Norms, the assumption of multicollinarity was not violated and all independent variables displayed tolerance levels greater than 0.1 and variance inflation factors less than 10 (Tabachnick and Fidell, 2007).

Table 8: Correlations between theoretical constructs

Variables	Intention	Attitude	PBC	SN
Intention	1.000	.591	.329	-.089
Attitude	.591	1.000	.038	-.245
Perceived Behavioral Control	.329	.038	1.000	-.127
Subjective Norms	-.089	-.245	-.127	1.000
Intention	.	.000	..000	.099
Attitude	.000	.	.290	.000
PBC	.000	.290	.	.033
SN	.099	.000	.033	.

Source: Field Survey Data, 2017

Relationship between Behavioral Intention to Use Rhizobium Inoculant and Attitude, Subjective Norm and Perceived Behavioral Control

Table 9 demonstrates that Adjusted R Square for this model is 0.444 which indicates 44.4% of the variation on intention to use rhizobium inoculant (dependent variable), intention to use rhizobium inoculant (dependent variable) can be explained by Subjective Norms, Perceived Behavioral Control and Attitude (independent variables).

Table 9: Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.672	.452	.444	.373

a. Predictors: (Constant), Subjective Norms, Perceived Behavioral Control, Attitude
b. Dependent Variable: Intention
***Source**: Field Survey Data, 2017*

ANOVA Analysis on Intention to Use Rhizobium Inoculant

According to Table 10, the F-value of 56.622 is highly significant at 5%. This indicates that the overall regression model with these three independent variables (Subjective Norms, Perceived Behavioral Control and Attitude) can well explain the variation of the dependent variable (intention to use rhizobium inoculant)

Table 10: ANOVA Analysis on Intention to Use Rhizobium Inoculant

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	23.589	3	7.863	56.622	.000
Residual	28.607	206	.139		
Total	52.195	209			

a. Predictors: (Constant), Subjective Norms, Perceived Behavioral Control and Attitude
b. Dependent Variable: Intention
***Source**: Field Survey Data, 2017*

Relationship between Behavioral Intention to Use Rhizobium Inoculant and Attitude, Subjective Norm and Perceived Behavioral Control

An equation is formed based on table 11 below to determine the statistical significance of each of the independent variables (Attitudes, Subjective Norms and Perceived Behavioral Control) on the dependent variable (Intention). Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity. A linear multiple regression model was fitted to estimate the factors that are perceived to influence or predicts farmers' intention to use rhizobium inoculant. The adjusted coefficient of determination (R^2) of 0.444 suggests that, 44.4% of the variation of farmers' intention to use rhizobium inoculant can be explained by the model. The result from the linear regression model revealed all the variables had significantly influence on farmers' intention to use rhizobium inoculant in the study area, which are attitude and subjective norms at 5.0% significant level whiles, perceived behavioral control at 10.0% significant level. The results revealed that attitude (β=0.603) has the greatest impact on farmers intention to use rhizobium inoculant. This means that every unit increase in attitude will result in 0.603 unit increase of farmers' intention to use rhizobium inoculant, with an assumption that all other variables are held constant. Next to attitude is subjective norms (β =0.318), which has the second strongest impact on farmers' intention to use rhizobium inoculant. For every unit increase in subjective norms, results in 0.318 unit increase in farmers' intention to use rhizobium inoculant.

However, perceived behavioral control (β=0.099) has the weakest impact on farmers' intention to use rhizobium inoculant as any unit increase in perceived behavioral control will result in 0.151 increase in farmers' intention to use rhizobium inoculant. From the analysis above, all the variables namely; attitude subjective norms and perceived behavioral control had a joint influence on the dependent variable.

Table 11: Relationship between Behavioral Intention to Use Rhizobium Inoculant and Attitude, Subjective Norm and Perceived Behavioral Control

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	1.631	.216		7.537	.000
Attitude	.428	.038	.603	11.332	.000
SN	.248	.041	.318	6.117	.000
PBC	.076	.041	.099	1.847	.066

a. Dependent Variable: Intention
Number of observation = 210 Prob. > .000 R – Squared = .452 Adj. R – Squared = .444
SN = **Subjective Norm**
PBC= Perceived Behavioral Control
***Source**: Field Survey Data, 2017*

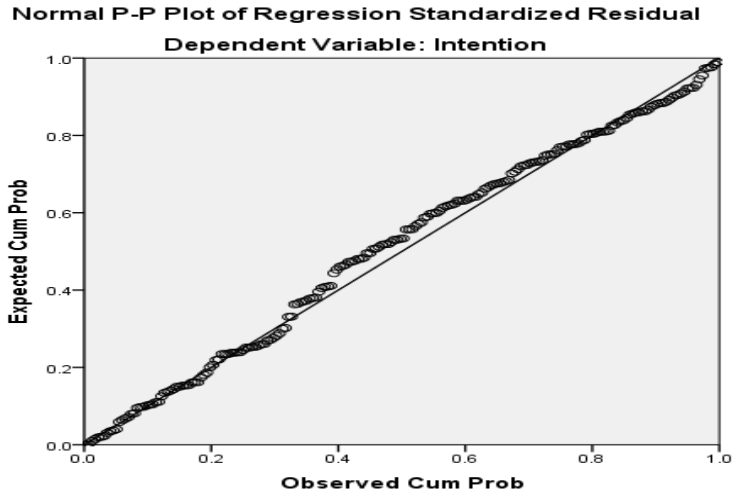


Figure 1: Normal Probability Plot of Regression Standardized Residual

Figure 1 above shows that, the estimated Intention to use rhizobium inoculant had a linear relationship. It therefore suffices to say that all the three independent variables namely; attitude, subjective norms and perceived behavioral control had a positive significant relationship with the dependent variable intention. However, to check

whether this strange case is having any undue influence on the results for our model as a whole as shown in the below 12, we can check the value for Cook's Distance given towards the bottom of the Residuals Statistics table. According to Tabachnick and Fidell (2007), cases with values larger than 1 are a potential problem. However, in our word, the Maximum value for Cook's Distance is 0.21999, suggesting no major problems.

Table 12: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Mahalanobis Distance	210	.05609	18.85173	2.98571	43.02854097
Cook's Distance	210	.00000	.21999	.0064066	.01768068
Centered Leverage Value	210	.00027	.09020	.0142857	.01449063
Valid N (listwise)	210				

Source: Field Survey Data, 2017

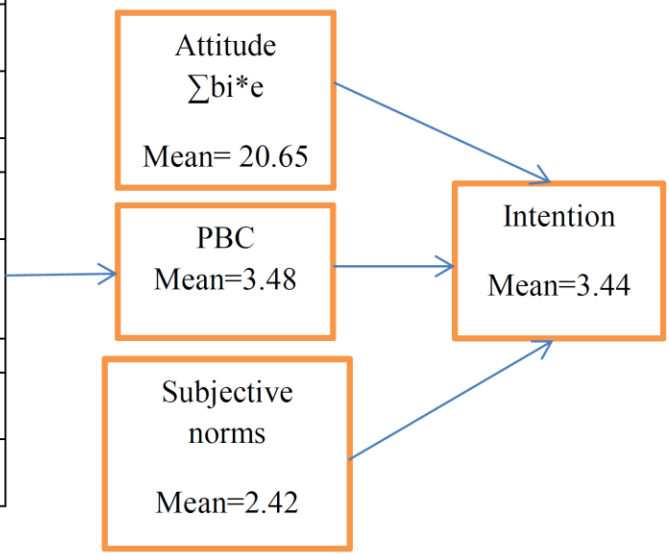
Rank Influential Attitude (A*I) correlation with Intention

When attitude measure (∑bi*e) was correlated with the intention to use rhizobium inoculant. The results of the correlation analysis revealed that two attitude items out of eight items were important contributors to influencing farmers' intention to use rhizobium inoculant. The attitude statements farmers perceived were, rhizobium inoculant being a cheap alternative to the use of inorganic fertilizer with a correlation coefficient of .200** indicating a driver and the ease of applying inoculant on their farms with a negative correlation coefficient of -.203** indicating a driver.

Table 13: Rank Influential Attitude (A*I) correlation with Intention

Statements	Correlation Coefficient	Indicators (Barriers/ Drivers)
Inoculant easily losses it viability if not use on time	-.018	Barrier
Inoculant is hardly available in the open market	.190**	Barrier
It is easy to apply inoculant	-.203**	Driver
The use of inoculant do not increase crop yield	-.113	Barrier
Rhizobium inoculant are a cheap alternative to the use of inorganic fertilizer	.200**	Driver
It easy to store inoculant	.195**	Barrier
Use of inoculant require a lot of labour	-.142	Barrier
The use of inoculant do not produces high quality crop	.051	Barrier

Source: Field Survey Data, 2017



***, ** and * denote that the variable is significant at less than 1%, 5% and 10% respectively

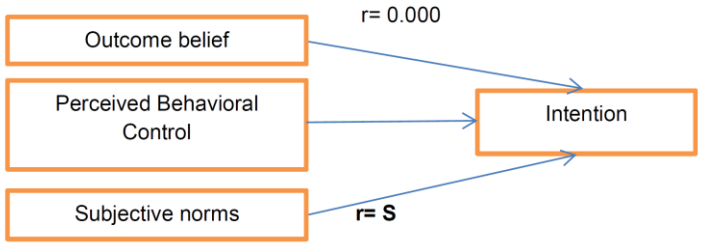


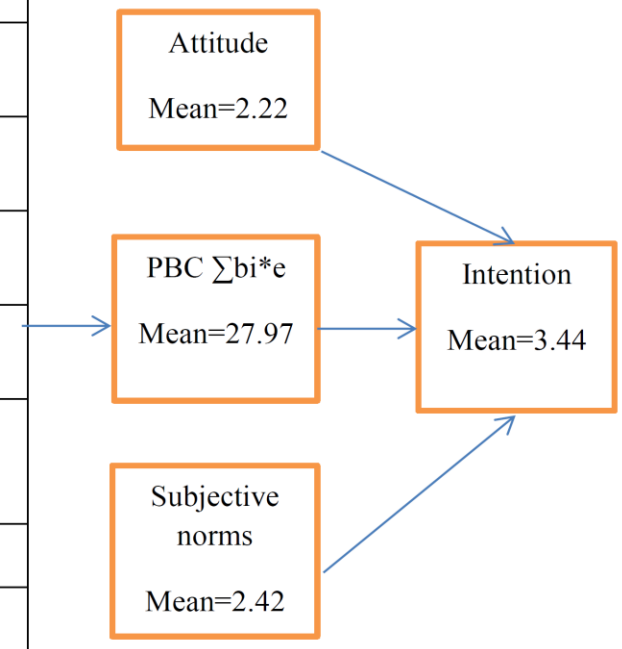
Figure 2: Rank Influential Attitude (A*I) correlation with Intention

Rank Influential Perceived Behavioral Control (PBC*I) correlation with Intention

When Perceived Behavioral Control measure (∑bi*e) was correlated with the intention to use rhizobium inoculant. The results of the correlation analysis revealed that, none of perceived behavioral control items contributed to farmers' intention to rhizobium inoculant. In other words, Perceived Behavioral Control (PBC) would not influence farmers' intention to use rhizobium inoculant. Since, farmers had no control over the use of rhizobium inoculant. Rhizobium inoculant presented farmers with some kind of challenges such as difficulties in storage and handling as well as it unavailability of the technology in the open market.

Table 14: Rank Influential Perceived Behavioral Control (PBC*I) correlation with Intention

Statements	Correlation Coefficient	Indicators (Barriers/ Drivers)
Lack of inoculant in the open market is serious constraint to the use of inoculant	-.099	Barrier
Lack of storage material for inoculant by farmers is serious constraint to the use of inoculant	.157*	Barrier
High loss of viability of inoculant is serious constraint to the use of inoculant	-.039	Barrier
Inadequate of knowledge on the application of inoculant is serious constraint to the use of inoculant	-.171*	Barrier
Delays in the delivery of inoculant by suppliers to farmers are serious constraint to the use of inoculant	.079	Barrier
High cost of inoculant is serious constraint to the use of inoculant	.179**	Barrier
Difficulties in handling inoculant is serious constraint to the use of inoculant	.172*	Barrier



Source: Field Survey Data, 2017
***, ** and * denote that the variable is significant at less than 1%, 5% and 10% respectively

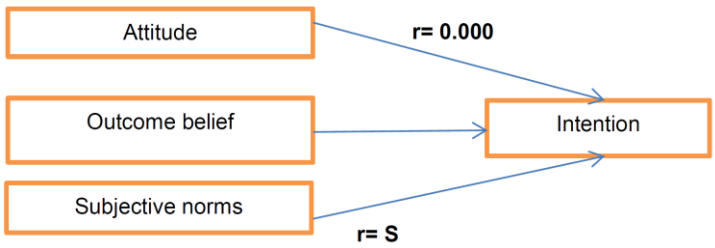


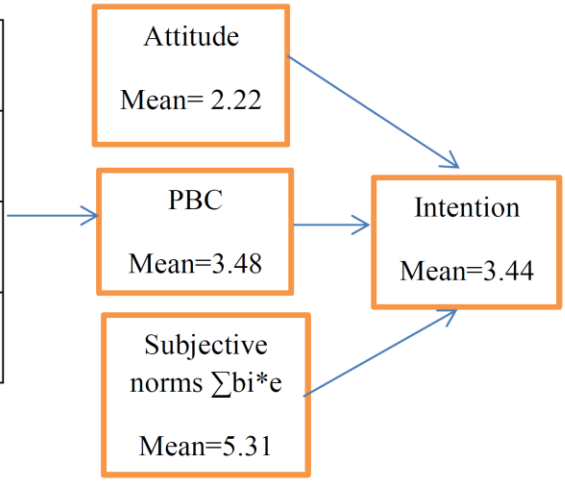
Figure 3: Rank Influential Perceived Behavioral Control (PBC*I) correlation with Intention

Rank Influential Subjective Norms (SN*I) correlation with Intention

From the table 13 below, the analysis revealed that respondents considered social pressure as a necessity to the use of rhizobium inoculant. In other words, farmers overall subjective norms would influence farmers intention to use rhizobium inoculant. Since, farmers perceived promoters of rhizobium inoculant as an in important contributor to the use of the rhizobium inoculant technology. Extension agents also played a significant role in influencing farmers' intention to use rhizobium inoculant.

Table 15: Influence of Subjective Norms on Intention

Statements	Correlation Coefficient	Indicators (Barriers/ Drivers)
Promoters of inoculant thinks that I should use inoculant on my farm to improve crop yield	-.243**	Driver
Fellow farmer thinks that I should use inoculant on my farm to improve crop yield	-.032	Barrier
Extension agent thinks that I should use inoculant on my farm to improve crop yield	.234**	Driver



Source*: Field Survey Data, 2017*
***, ** and * denote that the variable is significant at less than 1%, 5% and 10% respectively

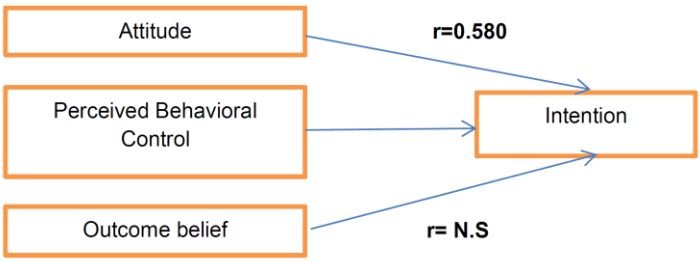


Figure 4: Rank Influential Subjective Norms (SN*I) correlation with Intention

CONCLUSIONS

In assessing the factors which affect farmers' intention to use rhizobium inoculant for their farming operation using Theory of Planed Behavior. The study shows that farmers' socio-economic characteristics, do not affect farmers intention to use rhizobium inoculant in the Northern Region of Ghana. Though, most farmers believe that rhizobium inoculant is an alternative way to use of inorganic fertilizer. Over 74.3% of farmers are willing to use rhizobium inoculant for their farming operation in the Northern Region of Ghana. This suggest that farmers would buy rhizobium inoculant if made available to them at the community level. Furthermore, considering the variables in Theory of Planed Behavior, which influences farmers' intention to use rhizobium inoculant, promoters of the technology as well as extension had a significant influence on farmers' decision to use. Though, farmer themselves could not influence their colleague since, there equally lack adequate knowledge on the technology. However, farmers did not have control over the use of rhizobium inoculant, which seriously discourage them on the use of rhizobium inoculant. Farmers' attitude towards the technology as well social pressure had an influence on farmers' decision to use the rhizobium inoculant. Based on these finding, this study calls for investors to take advantage of this existing opportunity since, farmers perceived the usage of rhizobium inoculant as an alternative way to use of inorganic fertilizer.

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