



Role of Knowledge, Attitude, on the Adoption of Improved Pearl Millet by Farmers in North-east, Nigeria

Mohammed Galadima, Salim Hassan, Norsida Man and Ibrahim Abdul Abu

Abstract: In Developing Countries Like Nigeria, An Effective Progression On Appropriate Improved Technologies Is Associated With Its Acceptance Among Farmers. This Study Investigated The Role Of Knowledge, Attitude, With Its Relationship And Influence Towards Adoption Of The Improved Pearl Millet By Farmers In North-East Nigeria. Purposive And Systematic Sampling Technique Was Used In Selecting 477 Pearl Millet Farmers In North-Eastern Nigeria. Respondents Information Were Collected Through Self-Report Questionnaire. Descriptive, Correlation And Regression Analysis Was Used To Analyzed The Data. Findings Revealed That, Respondents Level Of Knowledge Indicates High Level. While, Attitude Recorded Moderate Level. Also, Findings On The Adoption Level Among Respondents Recorded High Level. Furthermore The Outcome On The Relationship Between Knowledge, Attitude Towards Adoption Revealed Positive Relationship At ($P < 0.01$). Also, From The Results Of The Regression Analysis, It Revealed That Knowledge ($B = 283$) Contributed Most Towards Adoption. While, Attitude Did Not Contribute Towards Adoption. Hence, The Adj. R^2 Of 0.366 Indicates That Knowledge Had Significantly Contributed With 36.6 % Of The Variance Towards Adoption. Thus, The Study Suggest That, Pearl Millet Growers Should Be Encouraged Towards Developing Positive Attitude Towards Improved Pearl Millet Technologies. More So, Stakeholders In Collaboration With Change Agents Are Required To Strictly Focus On Programmes, With The Emphasis Towards Developing Farmers Attitude, Which Could Influence Adoption Of The Improved Pearl Millet And Other Relevant Areas Of Improvement In North-East, And Other Pearl Millet Producing Regions In Nigeria.

Keywords: Adoption, Attitude, Correlation, Knowledge, Relationship, Role

I. INTRODUCTION

In a developing country such as Nigeria, a significant progression of appropriate improved technology provides a means of acceptance and eventual adoption among farmers. Adoption of improved technologies, especially

improved pearl millet seed as the name implies, is a necessary precondition for plant breeding, thus creating a beneficial effect on farm households (1& 2). Nonetheless, the effect can be achieved by growing the crop, improving the quality and reducing the risk of production.

Some studies, however, indicated that the critical determinant of accepting and subsequently adopting new agricultural technologies is the learning process through which knowledge is processed, disseminated and implemented [3,4,5,6 &7]. Indeed, [8] reported that the advantage of

improved technology towards agricultural development is realized in the relationships to increase farmers productivity, higher income, and standards of living.

Nevertheless, the acceptance and subsequent adoption of improved agricultural technologies available to farmers has been largely determined by the need to increase production output and income. Thus, adoption, as a name suggests, is a decision by an individual or a group to accept and use technological innovation as the best course of action available [9&10]. Agricultural growth and development, therefore, depend mainly on the adoption of improved agricultural technologies, associated with climate-friendly seeds and modern agricultural practices to mention but a few [11& 12]. Hence, knowledge as well as attitudes which influence the adoption of the technological progressions by small-scale farmers who make up the majority in sub-Saharan Africa, including Nigeria, has remained very sluggish. [13].

Indeed, the acceptance and subsequent adoption of improved agricultural technologies available to farmers has been largely determined by the need to increase production output and income. Thus, adoption, as a name suggests, is a decision by an individual or a group to accept and use technological innovation as the best course of action available [9&10]. Agricultural growth and development, therefore, depend mainly on the adoption of improved agricultural technologies, associated with climate-friendly seeds and modern agricultural practices to mention but a few [11&12].

However, knowledge in this research refers all relevant information on the adoption practice towards improved pearl millet technology among farmers in North-east, Nigeria, which was not only limited to the information on improved technology alone but, practices such as the land preparation, sowing, thinning, fertilization, pest control, herbicide, harvesting, grading, packaging technology, transportation, and storage technology that involves the cultivation of improved pearl miller [14,15,16&17].

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Hence, in this research farmers level of knowledge was measured and categorized based on three level: low, moderate and high. While, farmer's attitude on the other hand, has to do with the behavior change among farmers

towards the adoption of improved pearl millet technology, which could be evaluated as low, moderate and high level as in the context of this study.

Indeed, Pearl millet as the subject of this research is a small-seeded cereal crop which has been grown for decades in the "sudano-Sahelian zone" of North Eastern Nigeria for its nutritive and food security values [18]. The main crop producers are small-scale farmers who have continuously grown local and low yielding unimproved Pearl millet which may include among others Maiwa, Buduma, Buduma-Damasak, Ex- Gashua, Ex-Tukur, and Zango [19]. Hence, the adoption of improved pearl millet technology, such as the High Yielding Varieties (HYV), such as SOSAT C-88, LCIC MV-1 LICC 9702 MV-2 to mention but few, which could lead to significant increases in agronomic productivity thereby stimulating the transition from low productivity subsistence agriculture to a high productivity agro-industrial economy which was observe to be very low [20]. Though, in the North-east, the acceptance and subsequent adoption of the improved pearl millet which has the abilities of yielding over 2.5-3-4 tons/ha-1 appears to be very little because of perceived high number of farmers who still grow the traditional varieties that only yields an output of 1-1.5 tons/ha-1 or below as a result of inadequate knowledge on the technologies, which could influence farmers attitude. It should thus, be noted that improved Pearl millet has higher yielding capacity that mature earlier (60 to 70 days as against 70 to 100 days for traditional varieties) (19& 21). In addition, the authors confirmed that, the crop is resistant to Striga spp, drought, pest and diseases, respond optimally to fertilizer and other management practices and more importantly, the grain size is larger while the panicle is more compact. With all these qualities; yet, farmers' adoption level remained very low.

Indeed, [22] confirmed that 40% yield is attributed to the practice of improved pearl millet technology but, yet farmers in the region continue to use the conventional local seeds that may lead to a decrease in about 40% yield. More so, farmers in North-eastern region were equally faced with numerous kinds of challenges ranging from high poverty level, ignorance and level of illiteracy resulting from insurgency [23,24,25,26&27]. Thus, these situations among others create the need for this research, which was aimed to response to questions on farmers' level of knowledge, attitude and adoption, the relationship between knowledge, and attitude towards adoption and also determination of the contribution of knowledge, and attitude towards adoption of the improved pearl millet technology among farmers in North-eastern Nigeria.

II. MATERIALS AND METHODS

This research was conducted in the North East region of Nigeria. The region covers a total land mass of about 241,076 km, which is approximately (26% of National total) occupying an arable land of about 7.9 million hectares with an average farm size of about 1.59 hectares. The average annual rainfall in the area is about 1500mm and could be as low as 500mm. Hence, the weather is often, dry and hot all over the year [28]. The inhabitants of the region were estimated at

twenty-six million, two hundred and sixty-three thousand, eight hundred and sixty-six persons (26,263,866) as at 2016 based on the estimates by [29]. The zone is bounded by the North Central and North-West zones of the nation while, the international borders are with Cameroon, Chad Republic and the Republic of Niger. The climate favors the production of varied crops, which include legumes (groundnuts and beans); cereals (maize, millet, sorghum, and rice), solanecious crops (peppers, tomato, garden eggs). The zone also provides a large livestock market. Hence, the North-eastern region is also known for their rich fishing and mineral deposits. The region also comprises of varied ethnic groups with majority been Fulani and Hausa.

The study used descriptive- correlational design. Hence, the design in question was used in similar studies as confirmed in the work of [30]. Purposive and systematic sampling technique was used to select respondents for the study, where three States (Bauchi, Borno, and Yobe) and Three (3) Local Government areas each, were purposively selected based on their higher level of participation in pearl millet farming in the region, making a total of 9 Local Government areas. Sample size was determine using [31] at 95% confidence interval to calculate the appropriate sample size and 398 was obtained out 100,700 study population. In the third stage, to avoid missing and unreturned questionnaires, 20 % of the relative sample was added using systematic sampling technique and the final sample size stood at 477. Thus, the figure in question serve as the acceptable sample size, which the research used to administer questionnaires to collect data, for subsequent analysis.

Nevertheless, data was collected through the use of self-report questionnaire to the farmers. Hence, out of Four Hundred and seventy-seven (477) questionnaires

distributed, Four Hundred and Fourty two (442), representing (92.66%) questionnaires were retrieved and duly answered, with a complete valid case and recorded as return rate. While, thirty-five representing (7.33%) were Unreturned questionnaires. Accordingly, the (442) valid return questionnaires were thus, used for data analysis in the study. Hence, the data were analysed and computed using Descriptive, Correlation and Regression analysis.

III. RESULTS

A. Respondents level of Knowledge

Findings presented in Table 1, on level of Knowledge on the improved pearl millet among farmers in the study area, revealed that knowledge among respondents was high with a frequency of 405 representing 91.6% ; with a mean value of 4.30. That means the majority of active pearl millet farmers in North-Eastern Nigeria had high level of knowledge towards the improved Pearl millet. This also implies that majority of respondents has good

understanding and comprehension of the context of the improved technology on pearl millet. The result further revealed that the second category of respondents fell into the moderate level with a frequency count of 33 representing 7.5% of respondents while, third category recorded low level of knowledge with a frequency count of 4 representing 0.91% among respondents. See Table

1.

Table 1: Respondents Level of knowledge on the Improved Pearl millet (n=442)

Level SD	Frequency	Percentage %	Mean
Low (1.00 -2.66)	4	0.91	4.30
Moderate (2.67 -3.99)	33	7.5	
High (4.00-5.00)	405	91.6	

Source: Computed from field survey, 2017

B. Respondents level of attitude

The findings on the level of attitudes towards the improved pearl millet is presented in Table 2. The result revealed that more than half of respondents recorded a moderate level of attitude with a frequency count of 362 representing 81.9% among respondents with a mean score of (3.44) by respondents. That means the majority of practicing pearl millet farmers in North-eastern Nigeria had a moderate level of attitude on the adoption of improved pearl millet. The result further revealed that the second category of respondents falls at a high level with a frequency count of 79 representing 17.9% among respondents. Whereas, the third and the least category fall into the low level of attitude with a frequency of 1 representing 0.2% by respondents, see Table 2.

Table 2: Farmers level of Attitude on improved pearl millet (n=442)

Level SD	Frequency	Percentage %	Mean
Low (1.00 -2.66)	1	0.2	3.44
Moderate (2.67 -3.99)	362	81.9	
High (4.00 -5.00)	79	17.9	

Source: Computed from field survey, 2017

C. Farmers Level of Adoption

From Table 3, farmers' level of adoption on the improved pearl millet as popularised by stakeholders in the study area were presented. The findings revealed that the adoption level of respondents on the improved pearl millet recorded high with a frequency count of 285 representing 64.5% among respondents. Followed by respondents that fall into the moderate level of adoption, with a frequency of 129 representing 29.2 % by respondents. while the least category falls into the low level of adoption with a frequency of 28 representing 6.3% of respondents. This implies that majority of practicing pearl millet farmers in North-eastern Nigeria have adopted improved pearl millet seed as captured in Table 3.

Table 3: Farmers level of adoption on improved pearl millet (n=442)

Level	Frequency	Percentage %	Mean	SD
Low (1.00 -2.66)	28	6.3	4.020	0.734
Moderate (2.67 -3.99)	129	29.2		
High (4.00-5.00)	285	64.5		

Source: Computed from field survey, 2017

D. Relationship between knowledge, and attitude towards the Adoption.

Based on the findings on the correlational analysis, the results on the relationship between knowledge, attitude towards Adoption is captured in Table 4, which revealed that a significant relationship existed between knowledge, attitude as independent factors towards adoption at (p<0.01) level of

probability. Thus, this result was confirmed that, there is a positive significant relationship between knowledge and adoption, which was supported by the correlation coefficient value of (r=0.469, p=0.000). It further revealed that, there is a positive relationship between attitude as towards adoption, which was equally supported by the correlation coefficient value obtained on attitude of farmers as indicated its coefficient (r =0.151, p=0.001), which showed positive relationship towards adoption.

Table 4: Relationship between knowledge, attitude towards Adoption

Variables	X1	X2	Y
X1 Knowledge	1		
X2 Attitude	.151	1	
Y Adoption	.469	.117	1
Significant	.000	0.14	
Mean	4.30	3.44	4.02
Standard Deviation	0.73	0.29	0.73

** Correlation is significant at p<0.01 Level (2 tailed)

E. Contribution of knowledge, and attitude towards adoption

To determine the most contribution of knowledge and attitude towards adoption among farmers in North-Eastern Nigeria, the regression model was used. Thus, the model in question consists of two independent variables which were analyzed namely; knowledge (X1) and attitude (X2) and so, the prediction equation is as follows:

$$Y = b_0 + b_1(X_1) + b_2(X_2) + e_i$$

Where:

Y = Adoption,

b₀ = Constant,

b₁₋₂= Estimates (regression coefficients),

X₁=Knowledge,

X₂ =Attitudes,

e = Error.

The proposed hypothesis to test, which examine the validity of the model was expressed below:

$$H_0: Y = \beta_0 + e_i$$

$$H_A: Y = b_0 + b_1X_1 + b_2X_2 + e_i$$

From Table 5, the regression results revealed that among the two independent variables; knowledge contributed significantly towards the adoption of improved Pearl millet technology among respondents where, coefficients for knowledge (β=0.283, p=000). While, attitude was not significant with a value of (β=0.047, p=0.623) since the t-value was 0.623 which is more than 0.05 but it has a relationship with adoption. Thus, knowledge was

considered the strongest independent factor that contribute most towards adoption of improved pearl millet due to its higher (β= 0.283). Hence, adjusted R² value was 0.366 which indicates that Knowledge contributes 36.6 % of the variance towards adoption of the improved pearl millet among respondents in North-Eastern Nigeria. Hence, the estimate coefficient could be presented as follows and see data in Table 5.



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$Y = .812 + 0.283 (\text{Knowledge}) + 0.047(\text{Attitudes}) + e^*$
 Increase in 1 unit of Knowledge, will therefore increase the DV by 0.283.

value was 0.366 which indicates that knowledge contributes 36.6 % of the variance on adoption.

Table 5: Regression of Knowledge, and Attitude towards Adoption

Predictors		Unstandardized Coefficients		Standardized Coefficients		Sig
		B	Std. Error	Beta	T	
Y	Constant	.812	.375		2.162	.031
X1	Knowledge	.283	.068	.193	.4.145	.000
X2	Attitude	.047	.095	.019	.492	.623

$R = 0.609$, $R^2 = 0.371$, $\text{Adj. } R^2 = 0.366$, $\text{Std. Error} = 0.584$
*significant; * $p < .05$; ** $p < .01$; *** $p < .001$*

IV. DISCUSSION

From the data presented above, this section attempt to discuss the overall findings as presented. Thus, from the findings, the outcome on farmers level of knowledge, attitude and as well adoption have clearly shown that, farmers level of knowledge towards the improved pearl millet had confirmed that, the greater proportion of respondents recorded high level of knowledge on the improved pearl millet. These results were in line with previous findings of [30,32;33,34,35&36]. Furthermore, results revealed that, the majority of the pearl millet farmers in North-eastern Nigeria recorded a moderate level of attitude towards the adoption of the improved pearl millet. These findings were in line with the previous results obtained by [32&37] who found that respondents had a moderate level of attitudes. More so, the outcome further revealed that, more than half of the respondents recorded high level of adoption on the improved pearl millet. These findings were in agreement with the findings of [38,27,39,40,41&42] who established that, respondents recorded a high level of adoption.

From the results, findings on the relationship between independent factors 'knowledge and attitude towards adoption were investigated. The findings revealed that, positive relationship existed between knowledge and adoption, which was supported by the earlier findings of [35,43&44]. Hence, the correlation coefficient value of ($r=0.469$, $p=0.000$) on knowledge also supported this findings. Furthermore, findings also revealed that, positive relationship existed between attitude and adoption, this was also supported by correlation coefficient value obtained on the attitude of farmers as revealed in the outcome of this research ($r=0.151$, $p=0.001$), which showed positive relationship towards adoption. These findings were equally supported by the previous studies conducted by [45,46,30,44&47] that, there was a positive relationship between attitude and adoption.

In addition, from the outcome, findings on regression analysis of this study revealed that Knowledge level of farmers contributed significantly towards the adoption of improved Pearl millet technology. While, attitude was not significant towards adoption, with a value of ($\text{Beta}=0.047$, $p=0.623$). Thus, Knowledge was considered the most contributing independent factor influencing adoption due to its higher Beta value of (0.283). More so, Adjusted R2

V. CONCLUSION

From the findings of this study, it concludes that, Thus, the overall that farmers level of knowledge was at high level. While, attitude is at a moderate level and the results on farmers level of adoption was also notice high. The finding further revealed that significant relationship ($p < 0.01$) existed between knowledge, attitude towards adoption and finding of the regression revealed that, knowledge contributes towards adoption. while the attitude did not contribute. Hence, knowledge is considered the most contributing independent factor towards adoption. Thus, the study suggests that farmers should be encouraged towards developing positive attitude towards the adoption of improved pearl millet. More extension agents should be deployed to intensify awareness creation on the use and acceptance of the technology, which could further boost adoption among farmers, thereby increasing the production output. More so, stakeholders in collaboration with change agents are required to strictly focus on programmes, via sensitization, educational campaign, on-farm trials, with the emphasis of developing positive attitude among, which could influence the adoption of the improved pearl millet and other relevant areas of improvement in North-east and other pearl millet producing region in Nigeria.

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