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Socioeconomic Factors Influencing Inter-Organizational Relationship between Kano State Agricultural and Rural Development Authority (KNARDA) and Technology Business Incubation Centre (TBIC) in Agricultural Mechanization in Kano State, Nigeria

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Abstract: *The study examined the socio-economic factors influencing inter-organizational relationship between kano State Agricultural and Rural Development Authority (KNARDA) and Technology Business Incubation Centre (TBIC) in Agricultural Mechanization in Kano State, Nigeria. Purposive and random sampling techniques were employed to select a total of one hundred (100) staff; fifty (50) from each organization. Primary data were collected directly from the respondents through field survey; with the aid of a well-structured questionnaire. Descriptive and inferential statistics were employed in data analysis. Descriptive statistics such as frequency distribution tables, percentages and mean were used to analyze objective I. Objectives II and III were analyzed using ordinary least square multiple regression analysis. The null hypothesis tested with Z and F-test at 0.5 level of significance were rejected. It was concluded that the respondents' socio-economic characteristics greatly influenced their level of participation in developing, incubation and transfer of improved technology packages on Agricultural Mechanization in the area. Necessary recommendations such as enhancing the socio-economic status of KNARDA staff in terms of their income and educational status to achieve easy and mutual relationship with their counterparts in TBIC as well as effective monitoring and evaluation of staff performances by the two agencies to ensure programme implementation and achievement of set objectives were made among others.*

Keywords: *Inter-organizational Relationship, Socioeconomic characteristics, KNARDA, TBIC, Agricultural Mechanization, Regression Analysis, Kano State, Nigeria.*

1. INTRODUCTION

Agricultural Mechanization constitutes vital input in improving agricultural food production in Nigeria. Both Pawlak, Pellezzi and Failer (2002) reported that Mechanization is cost effective in farming operations but it must be simple and compatible with farmers' socio-economic circumstances. Evidently, Agricultural mechanization enhances expansion of soil under cultivation, reduces human drudgery and yields desirable improvements in Agricultural food production. According to Keswet and Haggai (2006), agricultural mechanization is medium through which desirable development in food production and food security can be achieved. They therefore defined agricultural mechanization as forms of simple hand tools, animal traction and motorized equipments with advantages of enhancing cropping, timely harvesting, reduction in human labour demands, easy tillage of difficult soils and improved productivity.

Adekoya and Otono (1990) have provided the rational for agricultural mechanization on the premise that agricultural worker must be efficient producer to receive adequate returns by controlling power rather than being the primary source of labour. But, integration of agricultural mechanization in food production processes involves crucial activities with both farmers and agencies involved. These include training, fabrication of relevant and affordable tools, implements and technologies as well as measures to enhance access among the beneficiaries.

The two basic institutions with prospects and mandate to achieve the desirable integration of farm mechanization in Agricultural production in Nigeria are the Agricultural Development Programme

(ADP) and National Board for Technology Incubation (NBTI). According to Asiabaka, (1991), the State wide ADPs introduced and implemented since the 1980s have adopted a strategy of regularized information flow between research, extension workers and contact with farmers. But, Technology Business Incubation is a process of nurturing new or early stages enterprises with space, supportive environment for start-up and foster small and medium technologies with value addition (Majola 2001 and Ndagi, 2001). The basic principle is that local innovation and firm formation will result in indigenous growth. This situation is based on the promise that meaningful technology incubation can be achieved by combined efforts of science and technology through appropriate understanding of necessary linkages between technological innovation, industrial location and regional development (Okongwu, 2003).Technology Business Incubation is a Federal government sponsored programme established in 1987 as an enclave in Lagos has been established in other centres; including Kano State due to success recorded.

There seem to exist dearth of information as well as knowledge gab on the influence of the socio-economic characteristics of staff of these two agencies on their level of participation in technology development, incubation and transfer. This study was conducted in order to bridge this gap in knowledge. The study sought to provide answers to the following research questions. What are the socio-economic characteristics of the staff of the two agencies? What is the influence of the socio-characteristics of KNARDA staff on their level of participation in the transfer of improved agricultural mechanization packages to the rural farmers in the study area.

1.1. Objectives of the Study

Specifically the objectives of the study were to:

(i) describe the socio-economic characteristics of the staff of KNARDA and TBIC;

(ii) determine the influence of the socio-economic characteristics of the KNARDA staff on their level of participation on improved agricultural mechanization technology transfer; and

(iii) determine the influence of the socio-economic characteristics of the TBIC personnel on their level of participation on improved agricultural mechanization technology development, incubation and transfer.

1.2.Hypotheses

Three null hypotheses were tested in this study. These include:

Ho_1: There is no significant difference between the socio-economic characteristics of staff of TBIC and KNARDA in the study area.

Ho_2: There is no significant relationship between the socio-economic characteristics of staff of KNARDA and their level of participation in the transfer of improved farm mechanization technology packages in the study area.

Ho_3: There is no significant relationship between the socio-economic characteristics of staff of TBIC and their level of participation in the development, incubation and transfer of improved farm mechanization technology packages in the study area.

2. METHODOLOGY

This study was concluded in Kano State of Nigeria. Purposive and random sampling techniques were employed to collect primary data directly from the staff of the two agencies through questionnaire. Extension professionals in the two agencies constituted the population for the study. KNARDA & TBIC were purposively selected to represent public agencies charged with the responsibility of technology development, incubation and transfer in the area. The top management staff as well as their field officers were randomly selected. A total of 100 staff comprising 50 staff from each agency were selected and used for the study. Both descriptive and inferential statistics were used in data analysis. Objective I was analyzed using descriptive statistics such as frequency distribution table, percentages and mean; while objectives II and III were analyzed with multiple regression analysis. The null hypotheses were tested with Z and F-test at 5% level of significance.

2.1.Model Specification

The model is specified implicitly as:

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_n)$ and explicitly as

$Y = B_o + B_1X_1 + B_2X_2 + B_3X_3$ --- B_nX_n

Where:

Y= level of staff participation in development, incubation and transfer of improved agricultural mechanization packages (Number of activities engaged by a staff).

X_1 = Age of the respondents (years)

X_2 = Sex of respondents (dummy) Male = 1, Female = 0

X_3 = Marital status (dummy) Married = 1 Not Married = 0

X_4 = Educational attainment of the respondents (years)

X_5 = Working experience (years)

X_6 = Rank of staff/personnel

X_7 = Membership in staff union (member = 1, non-member = 0)

X_8 = Gross salary of Respondents per Annum (Naira)

X_8 = Family size (Number)

B_o = Constant

ut = Error term

$B_1 - B_9$ = Parameters to be estimated

2.2.Test of Hypothesis

The null hypotheses were tested with Z and F-test at 5% level of significance as shown below:

$$Z\text{-cal} = \frac{\overline{X1} - \overline{X2}}{\sqrt{\frac{d2}{n1} - \frac{d2}{n2}}}$$

Where:

X_1 = mean responses of the KNARDA staff

X_2 = mean responses of TBIC staff

δ_1 = standard deviation of KNARDA staff

δ_2 = standard deviation of TBIC staff

n_1 & n_2 =No. of respondents

- **Decision Rule:** If Z- cal > Z – tab, reject the null hypothesis; otherwise accept its alternative.

$$F\text{- cal} = \frac{R^2 (N - K)}{1-R^2 (K-1)}$$

Where: R^2 = Co-efficient of multiple determination

N = Sample size

K = Number of variables

- **Decision Rule:** If F-cal > F tab, reject the null hypothesis, otherwise accept the alternative.

3. RESULTS AND DISCUSSION

3.1.Socio-Economic Characteristics of the Respondents.

Table I showed that majority 90% of KNARDA and 98% of TBIC staff were within active ages of 31-50 years. The mean age of the respondents were 40 and 30 years for KNARDA and TBIC staff respectively. This implies that the staff members in both organizations were within active and productive years. Hence, they should be able to participate fully in agricultural mechanization activities in the study area. Fakoya and Daramola (2005) observed that respondents within this age

bracket are more innovative, motivated and adaptable; while Oladele (2007) found that personal characteristics such as age exert a lot of influence on the job performance of extension agents and researchers in Nigeria. The result of analysis on sex revealed that all staff of KNARDA were males, while majority 80% of staff of TBIC were males. This revealed gender imbalance in sex distribution of staff composition of both organizations; meaning that males were more engaged in the transfer of improved agricultural mechanization practices than females in the area. The implication is that gender sensitive technologies may not be given necessary attention. This conforms to the findings of Madukwe *et al*., (2000) who also reported that in ADPs and the universities, about 90 percent of agro-technical transfer workers where males. Furthermore, Sokoya (1998) found that agricultural technology transfer efforts of females in Nigeria have been limited by low participation of female extension agents. The findings of this study may have serious implications for research and extension in Nigeria and could lead to uneven distribution of agro-technologies to farmers of all genders. It is however known that, certain agricultural programmes are gender-related, hence the emphasis on Women-in-agricultural activities.

Table1. *Percentage Distribution of the Socio-economic Characteristics of the Respondents.*

	KNARDA		TBIC	
Parameters	Frequency	Percentage	Frequency	Percentage
Age				
Less than 20	0	0.00	0	0.00
21-30	3	6.00	30	60.00
31-40	23	46.00	19	38.00
41-50	22	44.00	1	2.00
51-60	2	4.00	0	0.00
Above 61	0	0.00	0	0.00
Mean	40.1		29.7	
Sex				
Male	50	100.00	40	80.00
Female	0	0.00	10	20.00
Marital Status				
Single	2	4.00	13	26.00
Married	48	96.00	37	74.00
Divorced	0	0.00	0	0.00
Separated	0	0.00	0	0.00
Widow/Widower	0	0.00	0	0.00
Mean	15.22		15.98	
Educational Qualification				
FSLC	2	4.00	0	0
WASC	2	4.00	0	0
OND/NCE	5	10.00	4	8
HND	30	60.00	12	24
BSC	8	16.00	30	60
MSC/MBA	3	6.00	3	6
Others	0	0.00	1	2
Mean	15.22		15.98	
Working Experience				
Less than 5	3	6.00	5	10.00
6-10	4	8.00	12	24.00
10-15	5	10.00	23	46.00
16-20	22	44.00	10	20.00
21-25	8	16.00	0	0
26-30	6	12.00	0	0
31 and Above	2	4.00	0	0
Mean	17.62		16.12	
Rank/Grade Level				
0-7	8	16.00	11	22.00
8-10	12	24.00	19	38.00
11-12	18	36.00	10	20.00
13-14	11	22.00	9	18.00
15 and Above	1	2.00	1	2.00
Mean	9.98		9.07	
Membership of Staff Union				
Yes	38	76.00	40	80.00
No	12	24.00	10	20.00

Annual Income (₦)				
(01-07) 345611-1,168,406	8	16.00	11	22.00
(0810) 1,475,675-2,000,354	12	24.00	19	38.00
(11-12) 2,211477-2.451,910	18	36.00	10	20.00
(13-14) 3, 3,301,203-4,150,095	11	22.00	9	18.00
(15 and Above) 4, 844,678	1	2.00	1	2.00
Mean	2, 241,944.06		2,010,389.68	
Family Size				
1-4	2	4.00	12	24.00
5-8	14	28.00	14	28.00
9-12	26	52.00	22	44.00
13 and Above	12	24.00	2	4.00
Total	50	100	50	100

Source: Field Survey, 2015.

Further analysis showed that majority 96% of KNARDA staff were married; while 74% of TBIC staff were also married. This shows that most of respondents in both agencies were married. This conforms to that of Adesiji (2006) who observed that most of the extension agents in South Western Nigeria were married adults. The result of the educational status of the respondents showed that majority 60% of KNARDA and TBIC staff had HND and BSc respectively. But, 24% of TBIC staff had higher degrees. This implies that the educational status attained by the TBIC staff is than their counterparts in KNARDA. Generally, the staff of both organizations possessed at least first degree certificate, indication that they were actually well-equiped educationally to be engaged in research – extension linkages. Education, especially higher education prepares people to more effectively obtain and utilize information to solve problems. It enables agencies and organizations cooperate with each other in shaving technical and other relevant information. This conformed to earlier research reports by Madukwe *et al*., (2000) who noted that education is facilitating factor in Agricultural Extension services.

Analysis of the working experience showed that majority 44% of the KNARDA staff had worked between 16-20 years; while 46% TBIC staff in both organizations. This showed that staff in both organizations had very long working experiences, which could promote specialization and improve their skill in agricultural mechanization. This contradicts Adesiji (2006) who observed that the selected States experience of extension agents in selected States of South Western Nigeria ranged between 5-10 years. He suggested that most of the extension agents had worked for years and probably need to undergo trainings in order to participate fully in the developmental activities.

Result in Table 1 showed that majority (82%) of the staff in KNARDA are between Grade level 08-14; while 80% of TBIC staff are between the Grade level 07-12; meaning that KNARDA staff were on higher grades than TBIC staff. Also, majority 76% and 80% of KNARDA staff and TBIC personnel were members of Staff Union, while few 24% and 20% of staff of KNARDA and TBIC do not belong to Staff Union. In addition, majority 82% and 76% personnel and staff of both agencies earned income between N1,475,675 to N4,150095 per annum, while 16% and 22% of staff of both agencies earn income between N345,611 to N1,168,406 and 2,0% earn income of N4,844,678 respectively. The result of this analysis had shown that the gross salary of the extension agents is very low when compared to that of their counterparts in TBIC. This is a serious problem because it could lead to lack of job satisfaction and inadequately in service delivery due to poor salary. This may lead to many people out of service as confirmed by Tanko, Adeniji & Nwachukwu (2013).

Further analysis revealed that majority (80%) and (72%) of KNARDA staff and Personnel of TBIC has household size of 5-12 persons; while 24% of KNARDA staff has a household of 13 persons and above. But, 24% of TBIC staff had household of 1-4 persons. This implies that the staff of both agencies has a large household size. This may be as a result of their religious beliefs of polygamous marriages and child bearing.

3.2. Relationship between the Socio-Economic Characteristics of the Respondents and Their Level of Participation in Developing, Incubating and Transferring Improved Agricultural Mechanization Technologies (N=50).

The result of data analysis in Table 2 showed a co-efficient of multiple determination R^2 87%. This showed that about 87% change in the level of staff of KNARDA participation in the development and dissemination of innovations on agricultural mechanization was influenced by their socio-economic characteristics.

Table2. *Summary of Multiple Regression Analysis on the Relationship between the Socio-economic Characteristics of the Respondents (Staff of KARDA) and their level of Participation in Developing, Incubation and Transfer of Innovations on Agricultural Mechanization in the Study Area.*

Variables Code	Variable name	Regression coefficient	Standard error	T – value	Level of Significance
b_0	Constant	-1.011	0.579	-1.747	1%
X_1	Age (years)	-0.003	0.012	-0.255	1%
X_2	Gender (Dummy)	-0.006	0.016	-0.376	NS
X_3	Marital Status (Dummy)	0.005	0.016	0.333	NS
X_4	Education (Years)	0.180	0.097	1.859	10%
X_5	Experience (year)	7.428	0.000	3.887	10%
X_6	Rank in Office	0.003	0.010	.262	1%
X_7	Membership of staff union	-0.083	0.130	-0.551	10%
X_8	Gross Salary (Naira)	0.212	0.121	1.747	5%
X_9	Family Size (Number)	0.006	0.012	.464	NS

Source: Field Survey, 2015.

R^2 = 0.868

Adj R^2 = 0.838

Standard Error of Estimates = 0.31054

Durbin Watson Constant = 2.123

F-ratio = 29.108

NS = Not Statistically Significant

The Age of staff (X_1) was negatively signed and statistically significant at 1% level of significance. This entails that increase in Age of the respondents led to decrease in their level of participation in the coordination, development and transfer of innovations on agricultural mechanization in the study area. But gender (X_2) was inversely and insignificantly related to their level of participation in the coordination, incubation and transfer of agricultural mechanization in the study area. This showed that gender difference exist in terms of participation in technology transfer among the respondents.

However, the respondents' marital status (X_3) bore a positive sign but was not statistically significant. This showed that both married and single staff of KNARDA participated fully in the coordination, Incubation and transfer of agricultural mechanization packages to the farmers in the study area. This is true and in consonance to a priori expectations because most of the KNARDA staff are married.

The educational status (X_4) was positively and significantly related to the dependent variable. This shows that improving the educational status of KNARDA staff would also improve their participation in development incubation and transfer of improved technologies on agricultural mechanization in the study area. Moreover, working experience (X_5) had a positive coefficient and was statistically significant at 1% level of significance. This showed that the higher the work level of participation.

The Respondents rank (X_6) was positively and significantly related to their level of participation in the development, incubation and transfer of technology. This means that the higher the rank of the respondents, the higher their participation in the transfer of innovations on agricultural mechanization in the study area. While membership of staff union (X_7) showed a positive and significant relationship at 5 per cent level of significance. This showed that staff members who belonged to staff Union participated more often in the development, incubation and transfer of agricultural mechanization innovations in the study area.

The gross salary of the respondents (X_8) bore a positive coefficient and was statistically significant at 5 per cent level of significance. This indicates that the higher the annual participation in the respondents, the higher their participation in the development, incubation and transfer of innovations on Agricultural Mechanization in the area. Finally, the respondents' family size (X_9) bore a positive coefficient but increase family size also increase the respondents' participation in Agricultural technology development and transfer.

The final regression equation is estimated below:

$Y= -1.011-0.003X_1-0.006X_2+0.005X_3+1.180X_4+7.428X_5+0.003X_6 - 0.083X_7+0.212X_8-0.006X_9$

(0.151) (0.121) (0.012) (0.579) (0.012) (0.016) (0.016) (0.09) (0.000) (0.010)

3.3. Influence of Socio-Economic Characteristics of the Respondents (Staff of TBIC) on Their Level of Participation in the Development, Incubation and Transfer of Improved Agricultural Mechanization Technology Package.

A Coefficient of multiple determination R^2 of 82.6% was obtained. This implies that about 82.6% change in the dependent variable was caused by changes in independent variables included in the regression model.

Table3. *Summary of Multiple Regression Analysis on the Effects of Socio-economic Characteristics of the Respondents (Staff of TBIC) on their Level of Participation in Developing and Disseminating Innovations on Agricultural Mechanization in the Study Area.*

Variable	Variable Name	Regression Coefficient	Standard Error	T-value	Level of Significance
	Constant	-2.269	0.635	-3.573	1%
X_1	Age	-0.010	0.012	-.851	1%
X_2	Gender	0.014	0.015	0.906	NS
X_3	Marital Status	0.011	0.008	1.315	NS
X_4	Educational attainment	0.514	0.077	6.632	1%
X_5	Working Experience	2.000	0.000	2.266	5%
X_6	Rank	0.003	0.017	1.198	10%
X_7	Membership of staff union	0.024	0.181	0.131	1%
X_8	Gross Salary	0.427	0.141	3.033	1%
X_9	Family Size	0.010	0.021	0.458	NS

Source: Data Analysis, 2015.

Where:

R^2= 0.826 = 82.6%

Adjusted R^2 = 0.787 = 78.7 %

Standard Error of the estimates = 0.344

Durbin Watson Constant = 1.837

F-ratio = 21.13.

Age (X_1) was negatively signed and statistically significant at 1% level of significance. This implies that the level of participation of the staff of TBIC in their project activities decreased with increase in their age. Gender (X_2) was negatively signed and statistically insignificant. This shows that there is gender discrimination in terms of participation in the agency's activities by the respondents. However, the respondents' marital status (X_3) was positively signed and statistically insignificant. This shows that marriage was not a barrier to participation in the agency's activities.

Further analysis revealed that the respondents' educational status (X_4) was positively and significantly related to the dependent variable at 1% level of significance. This shows that the higher the level of education attained by the respondents, the higher their level of participation in the agency's activities.

Working experience (X_5) was positively signed and statistically significant at 5% level of significance. This shows that the higher the level of experience of the respondents, the higher their participation in the project activities. Rank (X_6) and membership of staff union (X_7) were positively and significantly related to the dependent variable at 10% and 1% levels of significance. This means that they positively contributed to the respondents' participation in the activities of the agency.

Further analysis indicates that annual income (X_8) was positively signed and significantly related to the dependent variable at 1% level of significance. This entails that the respondents' whose income level is higher participated more in the agencies activities more than those with lower income. Also, the family size of the respondents (X_9) had a positive coefficient and was statistically insignificant; meaning that the higher the family size of the respondents, the more they participated in the technology incubation, development and transfer.

$$Y= -2.269-0.010X_1+0.014X_2+011X_3+0.514X_4+2.000X_5+0.003X_6+0.024X_7+0.427X_8+0.10X_9$$

(0.635) (0.012) (0.015) (0.008) (0.007) (0.000) (0.017) (0.181) (0.141) (0.021)

3.4. Test of Hypotheses

H^o_1: The null hypothesis which states that there is no significant difference in the socio-economic characteristics of the staff of KNARDA and TBIC was tested with Ƶ-test at 5% level of significance. Result showed that Ƶ – cal=55.986, level Ƶ-tab=1.96

- **Decision Rule:** If Ƶ –cal > Ƶ-tab, reject null hypothesis, otherwise accept its alternative. Since Z-cal (55.986)> Ƶ –tab (1.96), the null hypothesis was rejected, while its alternative was accepted. This implies that there is significant difference between the socio-economic characteristics of the staff of the two agencies.

H^o_2: The null hypothesis which states that the socio-economic characteristics of staff of KNARDA do not influence their level of participation in technology developing, Incubation ad transfer was tested with F-test at 5% level of significance. Result showed that F-cal (39.798)>F-tab (1.96). Thus, the null hypothesis was rejected; while its alternative was accepted. This implies that significant relationship exist between the socio-economic characteristics of staff of KNARDA and TBIC and their participation in agricultural mechanization in the study area.

H^o_3: The null hypothesis which states that there is no significant relationship between the socio-economic characteristics of staff of TBIC and their participation in technology development and transfer was tested with F-test at 5% level of significance. This was rejected because F-cal (29.108)>F-tab (2.18). This implies that there is a significant relationship between the socio-economic characteristics of the personnel of TBIC and their level of participation in the development mechanization technology packages in the study area.

4. CONCLUSION

This study had shown that the socio-economic characteristics of staff and personnel of KNARDA and TBIC greatly influenced their level of participation in development, Incubation and Transfer of Agricultural Mechanization packages to the rural farmers in their study area.

5. RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made:

(i) Improving the income and educational status of the respondents would contribute significantly/greatly to improved transfer of innovation to their rural farmers.

(ii) Effective maintaining and evaluation is a key administrative tool in extension practice; which should be adopted by the two agencies to ensure programme implementation and achievement of set objectives.

(iii) The technical competence of the two agencies should be enhanced through periodic trainings and workshop to enhance their job performance.

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