

Socio Economic Determinants Of Effectiveness Of Linkages In Cattle Marketing Innovation System

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Abstract: *This study investigated the determinants of effectiveness of linkages in cattle marketing innovation system of Adamawa State, Nigeria. Specifically, a null hypothesis and the relationship between socio economic characteristics of respondents and effectiveness of linkages among them were determined. A structured questionnaire was used to collect data from 300 respondents in three major cattle markets of the State using a purposive and multistage random sampling technique. Analytical tool used was the multiple regression technique. The result showed that 8 out of 9 of the socio economic variables included in the model were positive and significant at various levels implying that those variables were major determinants of effectiveness of linkages among respondents in the innovation system. Furthermore, the null hypothesis was rejected since 8 out of the 9 variables were positive and significant, implying that there is a significant relationship between socio economic characteristics of respondents and effectiveness of linkages among them. The study concluded that the socio economic variables included in the model were strong determinants of effectiveness of linkages in the innovation system and it thus recommended that governments and NGOs should encourage respondents to register in associations, acquire some level of education and experience so as to maintain effective linkage among them.*

Keywords: *Effectiveness, Linkages, Innovation system, Cattle marketing,*

I. INTRODUCTION

Innovation system concept though relatively new to agricultural policy makers, researchers and extension providers in developing countries, is increasingly suggested as a way to strengthen/improve production, performance and agricultural innovation capacity. Innovation systems are complex, open and dynamic activity systems where actors (individuals, groups, and organizations) apply their minds, energies and resources to innovations in particular areas of human activity such as agriculture, climate change, desertification and food security so as to improve its performance (Konig *et al.*, 2012; Klerkx *et al.*, 2009).

Livestock innovation systems are the nature of institutions (rules, norms and regulations) linkages and flows that connect actors to one another. It goes beyond the creation of knowledge to demand for livestock and use of knowledge in production and marketing of livestock in useful ways (Madukwe, 2011). This process contributes to agriculture

(livestock production, performance and marketing) through value chain and collaboration between pastoralists, livestock farmers, marketers, extension providers and facilitators to improve livestock production and marketing (Slingenberg *et al.*, 2002; Federal Department of Livestock and Pest Control (FDLPC), 2002). Innovation systems make it possible to assess system performance which is useful in comparative studies. The performance of an innovation system depicts the result that it achieves as well as how well it carries out essential functions for the innovation process. It is the extent to which it meets specific targets (outputs) by mobilizing, processing and transforming resources (input). The extent to which these outputs contribute to desired outcomes and impacts is paramount to the improvement or otherwise of agricultural livestock marketing.

Linkages are interactions/connections between actors, they create denser network ties. Linking technology users to technology developers and agro production to consumption is key to enhancement of innovation process and partnership.

Partners are characterized by sharing of roles resulting in increased synergy in technology development and dissemination. Locating relevant actors who make up an innovation system and mapping (a diagrammatic representation) their relationship in specific sub-sectors is important; it helps to identify actors who are involved in continuous innovation and determines those with strong and/or weak ties within the link. (Klerkx and Leeuwis, 2008; CTA, 2005)

Effectiveness of an organization is determined by the degree to which it realizes its goals (Etzioni in Munyua *et al.*, 2002). Effectiveness is the ability of an organization to be mobilized to meet its demands in the areas of production, adaptability and flexibility. Indicators of effectiveness include collaboration, technology transfer, information sharing/exchange (awareness) etc. In an innovation system, effectiveness is measured by the level of network connections in that system (Kolleck, 2013; Gwary, 2008).

Adamawa State is predominantly a cattle producing and marketing area where actors relate/ interact through links and networks; however, the effectiveness of the links and networks have not been clearly defined and ascertained. The main objective of this study was to examine the socio economic determinants of effectiveness of linkages among livestock marketers in the innovation system, specifically, the relationship between the socio economic characteristics of respondents and effectiveness of linkages among them was determined, furthermore, a null hypothesis which states that there is no significant relationship between the socio economic characteristics of respondents and effectiveness of linkages among them was analyzed.

II. MATERIALS AND METHODS

This study was conducted in Adamawa State located at the Northeastern part of Nigeria. It lies between latitudes 7° – 11° N of the equator and longitudes 11° – 14°E of the Greenwich meridian (Adebayo, 2004). A purposive and multistage random sampling technique was used to distribute questionnaires to cattle marketers. In the first stage, one state (Adamawa) was purposively selected from the three cattle producing states of northeastern Nigeria due to boko haram insurgency, in the second stage, three Local Government Areas (LGAs) were purposively selected (on the basis of the size of the market). The three LGAs make up the largest cattle markets in the state (Mubi and Ganye share their boarder with the Cameroon Republic, thus are involved in trans-border trades) and one major cattle market was selected from each of the LGAs. The LGAs selected were: Mubi-North LGA, Song LGA and Ganye LGAs. The third stage involved the random selection of 300 respondents from the cattle markets which was in proportion to population size of the market sampling frame (Table 1). The sampling frame was obtained from the agricultural development programmes (ADPs) and cattle marketers association at each of the markets from where the sample was drawn. Analytical tools used in the study involve the use of multiple regression analysis, (This was used to analyze both the effectiveness of linkages and the null hypothesis). The implicit form of the model is given by;

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_nX_n + U_i$$

Where Y= Effectiveness of linkages for each respondent (perceived effectiveness scores in numbers)

a = Constant

b = Coefficients

X₁ = Age of respondent (years)

X₂ = Sex

X₃ = Marital status

X₄ = Household size (No. of persons)

X₅ = Educational qualification (years)

X₆ = Years of experience (years)

X₇ = Herd size (No. of cattle marketed /market day)

X₈ = Membership in an association

X₉ = Average income (₦)

U_i = Error term.

Criteria used for selecting the lead equation conformed to the a priori expected economic criteria for the signs of coefficients, significance and size of coefficients of multiple determinations R² as well as F and t- ratios. Age, educational status, experience, herd size marital status, membership in association and household size were expected to be positive and thus positively affect effectiveness of linkages in the innovation system of the study area.

III. RESULTS AND DISCUSSION

The findings of this study are presented in section three of this paper. Out of the 300 questionnaires distributed to respondents, only a total of 282 were properly filled, returned and used for analysis.

RELATIONSHIP BETWEEN SOCIO ECONOMIC CHARACTERISTICS OF RESPONDENTS AND EFFECTIVENESS OF LINKAGES AMONG THEM

The result of the regression analysis which determined the relationship between socio economic characteristics of marketers and effectiveness of linkages between them is presented in Table 2. Four functional forms were tested (Linear, Exponential, Semi log and Double log), the double log equation was selected as best fit based on the a priori economic criteria for the signs and significance of the coefficients, size and significance of the coefficient of multiple determination R², F and T-ratios as well as a very minimal standard error of the variables.

The result from Table 2 reveals that the estimated coefficients of all the explanatory variables were found to contribute positively to the predictor variable, indicating that the coefficients of effectiveness of linkages were positive and significant except for X₂ = sex of the respondent which was positive but not significant. This means that as changes occur in each of the variables X₁-X₉, it leads to a proportionate change in effectiveness of linkages.

The coefficient of multiple determination R² was found to be 0.894, implying that 89.4% of the variation in effectiveness of linkages was accounted for by age, sex, marital status, household size, years of experience, number of cattle sold, level of education, membership in association and average income of respondents while the remaining 10.6% is

accounted for by variables not included in the model. This finding is supported by that of Madugu and Edward (2011) who observed that age, marital status, household size and experience were all positive and significant at various levels with a high R^2 (63.8%) in the relationship between smoked and dried fish distribution and marketing in Adamawa State.

The coefficient of age was positive and significant at one percent level, the value of the coefficient was 0.062 indicating that 1% increase in age will lead to an increase in effective linkage by 0.062. Also, the coefficient of sex of the respondents (0.027) was found to be positive but not significant. This implies that the absence of either of the sex in the innovation system may not have a significant effect on effectiveness of linkages in the system. The coefficient for marital status was found to be 0.568. The result indicates that effectiveness of linkages increases by a value equal to that of the coefficient as marital status of the respondent's increases by 1%. This may be due to the fact that the married are assumed to be more responsible thus more effective in cattle marketing in the study area. They are also more involved in decision making processes such as innovation processes which improves the effectiveness of linkages in an innovation system.

The result further revealed that the coefficient of household size (0.155) was positive and significant at 1% level, this means that with 1% increase in household size, there will be an increase in effectiveness of linkages by a value equivalent to the coefficient. The implication is that household members will have a favourable attitude towards collaboration and ease of exchange of information with other actors in the innovation system. It was observed from the result that the coefficient of years of experience was 0.108 and significant at 1% level. This implies that 1% increase in years of experience in cattle marketing will increase effectiveness of linkages between respondents by the value of the coefficient. It signifies that respondents will have more and better ideas to share with other actors in the system, doing so might positively influence the decision of other actors to adopt new or upgraded technology that will improve the entire innovation system of cattle marketing. The result also revealed that 1% increase in the number of cattle sold will increase effectiveness of linkages equivalent to the value of the coefficient obtained (0.383). The higher the number of cattle sold by the respondents, the more profit/returns is accrued to them, this can improve their social status and standard of living which might in turn create free and ease of interaction with other actors of the same social class thus increasing effectiveness of linkages and improving the innovation system.

Level of education also had a positive coefficient (0.055) which was significant at 1% level. It signifies that a unit increase in level of education leads to increase in effectiveness of linkages by 0.055. The implication is that with higher level of education, awareness and adoption of improved technologies among the respondents will increase, it can also increase the rate of exchange of information and participation in an innovation process within the innovation system.

Membership of association had a positive coefficient as *a priori* expected and was statistically significant at 5% level. The coefficient was found to be 0.128 indicating that

respondents who are members of associations tend to be more effectively linked than non-members. This may be due to the fact that associations facilitate interactions, access to resources, exchange of information, ideas or experiences. Members also tend to receive incentives such as provision of technical, credit or financial assistance, extension contact and veterinary services which lead to a faster development of an innovation system.

Furthermore, the result reveals that coefficient of average income was positive and significant at 5% level. The value of the coefficient was 0.004 indicating that with 5% unit increase in average income, there will be increase in effective linkages equivalent to the value of the coefficient among respondents in the innovation system. The implication is that respondents could have more funds at their disposal, they can make more investments and acquire resources required to improve the innovation system. These findings conformed to the *a priori* expectation indicating that the estimated effectiveness of linkages is an increasing function of the socio economic variables included in the model.

Based on the findings which reveals all variables included in the model to be positive and significant at 1% and 5% levels respectively except for X_2 (Sex), the null hypothesis which states that there is no significant relationship between socio economic characteristics of marketers and effectiveness of linkages was rejected. It was thus concluded that there is a positive and significant relationship between cattle marketer's socio economic characteristics and effectiveness of linkages among them.

IV. CONCLUSION AND RECOMMENDATION

It was observed that eight out of nine variables included in the regression were positive and significant, indicating that an increase in these variables will improve the effectiveness of linkages by their corresponding coefficient values: 0.062, 0.568, 0.155, 0.108, 0.383, 0.055, 0.128 and 0.004 respectively, therefore, it was concluded that there is a significant relationship between marketers' socio economic characteristics and effectiveness of linkages among them. Socio economic variables such as membership in association, and level of education were found to have positive impact on effectiveness of Linkages among respondents. It was thus recommended that Governments and NGOs should encourage actors to register in associations, acquire some education and experience in order to maintain effective linkages among respondents.

| Markets | Total population | Number selected | Percentage |
|--------------|------------------|-----------------|---------------|
| Mubi | 1173 | 110 | 36.67 |
| Ganye | 1021 | 100 | 33.33 |
| Song | 921 | 90 | 30.00 |
| Total | | 300 | 100.00 |

Table 1: Sample Frame and size

| Double – Log Explanatory variables | Function Coefficients | T-values | Standard errors | R ² | F- value |
|--|--------------------------|--------------------|--------------------|----------------|-------------|
| Constant Term | 2.675 | 116.9*** | 0.022 | 0.894 | 251.76 |
| X ₁ =Age | 0.0621 | 3.33*** | 0.019 | | |
| X ₂ =Sex | 0.0027 | 0.29 ^{ns} | 0.009 | | |
| X ₃ =Marital status | 0.5683 | 4.60*** | 0.012 | | |
| X ₄ =Household size | 0.1549 | 13.08*** | 0.012 | | |
| X ₅ =Years of experience | 0.1076 | 7.67*** | 0.014 | | |
| X ₆ =Number of cattle sold | 0.3829 | 13.10*** | 0.003 | | |
| X ₇ =Level of education | 0.0551 | 4.03*** | 0.014 | | |
| X ₈ =Membership in association | 0.1276 | 1.92** | 0.007 | | |
| X ₉ =Average income | 0.0037 | 2.03** | 0.002 | | |

Source: Field Survey, 2016

***: Significant at 1% level

** : Significant at 5% level

Significant at $P < 0.05\%$

Table 2: Socio Economic Determinants of Effectiveness of Linkages among Respondents

REFERENCES

- [1] Adebayo, A.A. (2004). Adamawa state in maps. Pp112. Second Edition Paracelate Yola, nigeria.
- [2] CTA: Technical Center for Agricultural and Rural Cooperation (2005). Methodological Framework: Analyzing the Agricultural Science, Technology and Innovation (ASTI) Systems in ACP countries. CTA Wageningen, CTA/UNU-INTECH/KIT Pp 10.
- [3] FDLPC: Federal Department of Livestock and Pest Control (2002). Annual Scientific Reports. FDLPC Annual Publications. Available at
- [4] www.nvri.gov.ng/images/annual%20Report%202002.pdf. Accessed, 30th Oct, 2015.
- [5] Gwary, M. M. (2008). Evaluation of the Effectiveness of Participatory Research and Extension Approach in Promoting Sustainable Agriculture in Borno State, Nigeria. An Unpublished Ph.D thesis Submitted to the Department of Agricultural Economics and Extension, University of Maiduguri, Borno State, Nigeria.
- [6] Klerkx, L., Hall, A and Leeuwis, C. (2009). Strengthening Agricultural Innovation Capacity: are Innovation Brokers the Answer? Working Paper No 2009-019, united Nations University Maastricht Economic and Social Research and Training Center on Innovation and Technology (UNU-MERIT), Maastricht.
- [7] Klerkx, L. and Leeuwis, C. (2008). Matching Demand and Supply in the Agricultural Knowledge Infrastructure: Experiences with Innovation Intermediaries. Food Policy 33:260-276
- [8] Kolleck, N. (2013). Social Network Analysis in Innovation Research: Using a Mixed method Approach to Analyze Social Innovations. Eur. J. Future. Res. 1:25
- [9] Konig, B., Kuntosch, A., Bokelman, W., Doernberg, A., Wim, S., Busse, M., Siebert,
- [10] R., Knut, K. and Thomas, S. (2012). Analysing Agricultural Innovation Systems: A multilevel mixed method approach. A paper presented at the 131st EAAE seminar. 'innovation for agricultural competitiveness and sustainability of rural areas', prague, Czech Republic, Sept 18-19, 2012.
- [11] Madugu, A. J and Edward, A. (2011). Marketing and Distribution Channel of Processed Fish in Adamawa State, Nigeria. Global J. Business and Management Research, 11(4):21-26.
- [12] Madukwe, M. C. (2011). Introduction to Systems of Innovation in Agricultural Extension: in Madukwe, M. C (eds) Agricultural Extension in Nigeria, 2nd edition. Agricultural Society of Nigeria AESON, 2011.
- [13] Munyua, C. N., Adams, P. F and Thomson, J. S. (2002). Designing Effective Linkages for Sustainable Agricultural Extension Information Systems among Developing Countries in Sub-Saharan Africa. Proceedings of the 18th Annual Conference of AIAEE, Durban, South Africa.Pp 301-306.
- [14] Slingenber, J., Hendrickx, G and Wint, W. (2002). Will the Livestock Revolution in Developing World Succeed? In AgriWorldVision. International Agribusiness, Marketing and Management, 2(4).