Journal of Sustainable Development in Africa (Volume 11, No.4, 2009)
ISSN: 1520-5509
Clarion University of Pennsylvania, Clarion, Pennsylvania

SOYBEAN INNOVATION SYSTEM IN BENUE STATE

By: Shimayohol Daudu

ABSTRACT

The study examined the soybean innovation system in Benue State, Nigeria. A total of 100 respondents were selected using simple random sampling technique. Data were analyzed by use of frequency, percentage and mean statistic. The result of the study indicated that the age range and proportion of young adult in the soybean (80%) innovation system was ideal for innovation to take place. There were also high proportion of married critical actors and an enlightened population suggesting an ideal population for innovation system to function optimally. However, there was poor interaction among critical actors in the soybean innovation system. Of the five component of actors examined only Demand (x = 4.26) and enterprise component (x = 4.02) scored high interaction while diffusion (x = 2.24), research (x = 2.23) and infrastructure (x = 2.24) recorded low interaction. It was also noted that there was weak linkage among the critical actors in the soybean innovation system especially reciprocal interaction. It was therefore, recommended that agricultural development agencies (especially soybean) should ensure interaction among the actors in the five components by organizing regular stakeholders' conferences, seminars and soybean farmers' fora. secondly, policy makers should enact and implement policies to institute reciprocal interaction among the actors in the five components by revitalization of soybean cooperative societies with rotational meetings among societies and ensuring general improvement in private sector funding of soybean research and development and the implementation of an arrangement for a soybean extension strategy such as special program for intensive soybean production with specific interactive roles assigned to all stakeholders in the soybean innovation system.

Keywords: soybean innovation system, critical actors, linkage mapping.

INTRODUCTION

Innovation is the application of knowledge in production and consists of the process by which firms master and implement the design and production of goods and services that are new to them irrespective of whether they are new to their competitors, their countries or the World (Ernst, Ganiatios, and Mytelka, 1998). Innovation can also be regarded as the development, adaptation or imitation and the subsequent adoption of technologies that are new within a specific context (CIA/UNU – INTECH/KIT, 2005). It is not science and technology but knowledge and how to facilitate it. It is fundamentally a process of learning through knowledge and information flows that result through interaction.

The National innovation system is that set of distinct institutions which jointly and individually contribute to the development and diffusion of new technologies and which provides the framework within which government form and implement policies to influence the innovation system. Consequently, it is a system of interconnected institutions to create, store and transfer the knowledge, skills and artifacts which define new technologies (Niosi, 2002; Francis, 2005). The concept of national innovation system rests on the premises that understanding the linkages among the actors involved in innovation is a key to improving technology performance. This implies that the innovation and technical progress are the result of a complex set of relationships among actors producing, distributing and applying various kinds of knowledge (OECD, 1997). The rationale for the study of innovation system is that an analysis of the innovation system can help policy makers identify the leverage points for enhancing innovative performance and competitiveness. Besides, the analysis pinpoints mismatches within the innovation system (OECD, 1997).

Agricultural innovation systems include both users and producers of information and must link them in a dynamic process that needs to be supported by appropriate framework condition not just policies but also financial, business and educational system (NRI, 2005). Diyamett (2004) suggested that use of innovation clusters approach, defined as reduced systems of innovation, as being more important fort African nations than any other region of the world. According to Nwamila, Diyamett, Tebu, Mytelka, and Trojer (2004) there is the problem of conceptualizing innovation system. The understanding of innovation clusters at a deeper level including their origin, growth patterns, internal dynamics, limitation basic concepts and ideas is poor. They suggested that people interested and capable of working with innovation systems and innovation clusters should carry out research in areas of conceptual and empirical issues surrounding innovation and clusters.

The CTA/UNU – UNITECH/KIT (2005) noted that national markets in the developing world are highly fragmented and national research and development institutions are poorly linked to the production centers as a result these centers do not sufficiently and adequately supply science, technology and innovation to facilitate meeting the challenges of competing effectively in the global market. Consequently, strengthening innovation system is extremely important to improve the interface between scientists, policy makers and decision makers as they relate to science, technology and innovation policy formulation.

Despite many initiatives soybean production in Benue State has not recorded any marked adequacy of quantum of soybean production. The soybean mill at Taraku produces below capacity. Furthermore, importation of soybean, the primary raw materials is done from Brazil and neighboring West African countries unabated (Abaagu, 2004). Moreover, the product innovations in soybean are not patented and some not accepted (Lawal, Chisonum, and Ater, 2005). Neither are adequate loan facilities available for commercial activities in the soybean industry. Consequently, most of the innovations have not produced the desired result

Ayoola (2004) suggested the following measures to mitigate this situation: (1) institutional integration where the relevant agencies and corporate bodies come together in the process of generating commercial research findings and technological break through and (2) monitor the appropriateness of the existing and newly emerging innovations. This call for a study of the innovation system of soybean in Benue State in order to suggest policy options: What are the personal and socio-economic characteristics of critical actors in the soybean innovation system in Benue State? What is the degree of interaction among critical actors in the soybean innovation system? What is the relationship and flow of information among critical actors in the soybean innovation system?

The over all purpose of the study was to assess the soybean innovation system in Benue State. The specific objectives of the study were to: determine the personal and socio-economic characteristics of the critical actors in the soybean innovation system; assess the degree of interaction among the critical actors in the soybean innovation system and map the relationship and flow of information among the critical actors.

MATERIALS AND METHODS

Study area:Benue State derives its name from River Benue, the second largest River in Nigeria. The State is located in the central agro-ecological region of Nigeria.

According to the 2006 census the population of the state is 4,219,244 (NPC, 2006). It occupies a total land mass of 30855 square kilometers (Benue State Government, 2002). Majority of the people are subsistent arable farmers while the river line inhabitants have fishing as their primary occupation. Benue State is the largest producer of soybean, beniseed, cassava and yam in Nigeria. Subsistence and rain fed traditional farm practices are the dominant mode of farming.

Benue state comprises 23 administrative local government areas. The state is divided into three agricultural zones. Soybean is mainly produced in the Northern and Eastern Zones (BNARDA, 2000).

Population and Sampling Procedure

The population of this study was stakeholders (Critical actors) in the soybean industry. Specifically it consisted of sample drawn from two local government areas from each of the northern and eastern agricultural zones of Benue state. The two zones are the dominant soybean production zone in Benue State (BNARDA, 2000).

Selection of samples in each of the LGAS was based on the segmentation of actors in the soybean innovation system into components. According to CTA/UNU-INTECH/KIT (2005) the component of the agricultural science technology innovation (ASTI) system can be classified into five components namely: demand enterprise, diffusion research and infrastructure. Demand component**:** Actors includes consumers of food and food producers in rural and urban areas; consumers of industrial raw materials, international commodity market.

Enterprise Components**:** farmers; input suppliers (seeds, agro-chemicals, animal feed), service suppliers (advice, credit, insurance, machinery rentals etc); commodity traders, transporters; agricultural processing industries; farmer and trade organization representing business interest. Diffusion Components**:** Extension service (public/private), non-governmental organizations (NGOs) and community based organizations (CBOs), farmer and trade organizations, input and service suppliers.

Research Component**:** National and international agricultural research organizations; universities and other institution of higher learning, private research foundations; private companies and NGOS with own research facilities.

Infrastructure Component**:** Policy making process and agencies; Banking and financial system, transport and marketing system, information and communication infrastructure; professional networks, including farmer and trade organizations, regulatory agencies (IPR, Sanitary and phyto-sanitary regulations etc), standard setting bodies.Five respondents were selected by purposive sampling methods from each the 5 component from each of the four sampled local government areas (LGAs): Gboko, Gwer, Katsina-Ala and Makurdi LGAs. The four LGAs were selected by simple random sampling method. An over all total of 100 respondents were selected through purposive and random sampling method.

Instrument for Data Collection

Data were collected through the use of interview schedule and questionnaire. Both instrument were validated to reflect all the objective of the study. These were administered to respondent in each LGA.

Measurement of Variables

Objective I was measured in age ranges in years as 20 – 30 years, 31 – 41 years, 42 – 52 years, 53 and above years; marital status was measured as single, married, divorce or widowed. Education status was measured as No formal education/SSCE/NECO/WASC/OND; HND/Bachelor degree, or higher degree; Gender was measured as male or female; while farm size was measured as small scale (≤ 1 ha) (*Akundu atuan,Tiv language*), medium size (2 – 3 ha) (*akundu pue – akundu pue kar ataan*), large scale (*akundu ikyundu – Akundu ikyundu kar ataan*) (4 – 5 ha) or very large scale (>5 ha) i.e. (*akundu ikyundu kar ataan*).

Objective 2 was measured as follows:

In order to determine the degree of interaction, the interaction scores level were scored as follows:

Number of people contacted	Interaction score
None	0
1-5	3
6+	6
Frequency of contact	**Interaction score**
None	0
Monthly	1
Weekly	4
Daily	9

Interaction level/nature of interaction (i.e. mean interaction score)

Interaction level of actors in each component was determined by asking the respondents to indicate his interaction with actors in each of the components. Using a 7 point Likert type scale as follows: No. of people contacted: none = 0, 1 – 5 = 3; 6+ = 6; frequency of contact: none = 0; monthly = 1, weekly = 4 and daily = 9. These values were added to get a value of 23 which was later divided by 7 to get a mean of 3.29. The respondents' mean was obtained on each of the item. Any mean (x) score ≥ 3.29 was regarded as high, while any mean score less than 3.29 was regarded as not high.

Total interaction score (TIS) i.e. degree of interaction among the actors in the components of the soybean innovation system was determined as follows: the mean x score (3.29) was multiplied by 20 (the possible combinations) or interaction among the components) which gave a mean score of 65.80. Consequently any mean score ≥ 65.80 was regarded as high, while any mean score less than 65.80 was regarded as not high.

Objective 3 was achieved by constructing an actor linkage map;

Specifically, objective 1 was analyzed by use of frequency and percentage; objective 2 was analyzed using mean statistic; and Objective 3 was analyzed by use of mean statistic.

RESULTS AND DISCUSSION

Personal and Socio-Economic Characteristics of Critical Actors in the Soybean Innovation System

Age

Table 1 shows that most (35%) of the respondents in the Demand components were between 31 and 40 years. Also those of between 31 – 50 years and between 51 and above years each accounted for 25% of the respondents respectively, while 15% of the respondents were within 41 – 50 years old. This signifies that most of the actors in the demand components were middle age that are virile and capable of having useful interaction which may result in innovation. On the other hand, data in Table 1 reveal that most (50%) of the actors in the Enterprise component were between 21 and 30 years, while 15% of the respondents were between 31 – 40 years old. Also respondents between 41 and 50 years and those between 51 and above years each accounted for 15% of respondents respectively. This shows that actors in enterprise component were young adult and may probably interact freely to enhance innovation in the soybean innovation system.

Data in Table 1 also indicate that most (45%) of the actors in the Diffusion components were between 41 – 50 years. Also those between 31 – 40 years and 51 and above years each accounted for 25% of the respondents respectively while 10% of the respondents were between 21 – 30 years. This indicates that actors in the Diffusion components were mainly middle aged. This implies that these respondents may probably interact to enhance the soybean innovation system since they are matured.

Data on Table 1 also show that among the respondents in the Research component most (50%) were between 31 and 40 years. This was followed by those between 41 and 30 years who accounted for 35% of the respondents while the least represented age range were those between 51 and above years who accounted for 5% of the actors in the Research component. This shows a more youthful respondent. The implication of this finding is that those actors will interact more easily and innovation may probably result from this interaction.

Finally, Table 1 shows that actors in the infrastructure components consisted of respondents who were most (35%) between 31 – 40 years; this was followed by those between 21 – 30 years who accounted for 30% of the respondents while those between 51 and above years accounted for 20% of the respondents. The least represented age range was that of between 41 and 50 years which accounted for 15% of the respondents. This shows that most of the respondents were young. These respondents are active and will probably interact to enhance the innovative performance of the soybean innovation system.

The age distributions of the various components indicate young – middle age dominance. The data also reveal that in term of age distribution actors in the demand enterprise, research and infrastructure have most of their respondents between 21 – 30 years and 31 – 40 years age ranges.

Only diffusion respondents have their modal age range as: 41 – 50 years. Consequently, interaction will probably be facilitated between actors in the demand, enterprise, research and infrastructure components. According to Obinne (1994) transfer of ideas (interaction) most frequently occurs between homophonous persons, say, in age. Policy options to create interaction between Diffusion respondents and the rest of the components needs to be put in place to enhance innovation in the system.

Marital Status

Data in Table show that most (65%) of respondents in the Demand component were married. Single and widowed respondents each accounted for 15% of the respondents respectively while 50% of the respondents were divorced. This shows that most of the respondents were married and may probably undertake useful interaction. This is because married people take seriously useful engagement.

Data in Table 1 also show that most (80%) of the enterprise component actors were married while 20% were single. This shows that most of the respondents were married. This is probably because soybean business requires labor which is readily supplied by wives and other family members. This suggests that innovation may probably be possible.

Data on Table 1 also show that most (95%) of the Diffusion component respondents were married while 5% were single. This shows that most of the respondents were married. This shows a serious minded group which may interact to create innovation.

Data on Table 1 also show that most (65%) of the respondents in the Research component were married. Also 25% were single, while the divorced and widowed each accounted for 5% of the respondents respectively. This shows that most of the respondents were married. The respondents may probably engage in useful interaction.

Data on Table 1 also show that most (80%) of the infrastructure component respondents were married while 20% were single. This shows that most of the respondents will probably engage in useful interaction that may result in innovation.

The results of the study show that most of the respondents among the components were married which suggest a homophonous population in marital status. The implication of this finding is that innovation may probably take place in the soybean innovation system because married people tend to take any profitable activity very serious.

Educational Status

Table 1 shows that most (60%) of the respondents in the Demand components had no formal education while 40% had SSCE/NCE/WASC. This shows that most of the respondents had little or no formal education.

Data in table also that half (50%) of the respondents in the respondents in the enterprise components had formal education and the other half (50%) had SSCE/NCE/WASC. This shows that most of the respondents had little or no formal education.

Data in Table 1 also show that most (80%) of the Diffusion component respondents had HND/Bachelor degree while 20% had higher degree. This shows an enlightened component. This is probably because this category of actors requires a high qualification before employment. High qualification is necessary for innovative interaction to take place.

Table 1 also shows that most (55%) of the respondents in the Research component had higher degrees while 45% had HND/Bachelor degree. This represents an intellectual group. This is probably because high educational qualification is necessary to carry out research. The research component will probably interact to create innovation in the innovation system.

Data in Table 1 further show that of the respondents in the infrastructure component, most (45%) had SSSCE/NCE/WASC, 35% had HND/Bachelor degree while 20% had higher degree. The infrastructure component shows an educational enlightened component. This is probably because this component requires qualification for employment. This implies innovation will probably take place because highly educated people engage in useful ventures. Therefore innovation may probably be facilitated by this enlightened actor component.

Gender

Table 1 shows that most (70%) of the respondents in the Demand component were female. This shows a female dominated component. This is probably because more female use soybean to create innovations such as soymilk, Soy flour etc. Thus female should be given consideration ensure innovation in the soybean innovation system.

Table 1 also shows that most (65%) of the respondents in the Enterprise component were male. This shows that most of the respondents in the components were male. Thus, the Enterprise component was gender insensitive, being dominated by male. This is probably because cultivation of soybean is usually done by men while harvesting, a less stressful job, is done by female.

Table 1 also shows that most (80%) of the respondents in the Diffusion components were male. This shows that the diffusion component was not gender sensitive. This is probably because the Training and Visit System as originally conceived did not take consideration of the role of women in extension (FMWRRD, 1989).

Table 1, finally, indicate that most (65%) of respondents in the infrastructure component were male. This also shows a male dominant component. This is probably because employment in the government agricultural sector is dominated by the male folk.

Gender perspectives in innovation in soybean innovation system indicate that apart from the Demand male dominated component that was dominated by female components. This shows that the soybean innovation system is male dominated and gender insensitive. Innovation can take place in the system because most of the components will exhibit homophonous interaction because of the male dominance in most of the components.

Farm Size

Table 1 shows that most (85%) of the demand components cultivated soybean on a small scale and only 15% of the respondents on a medium scale. This shows that most of the respondents in the Demand component cultivated soybean on a small scale. This is probably because users of soybean e.g. Taraku Mills engage in contract farming of soybean to feed the industry. Also market women who use soybean to make soya milk, soya “magi” etc also cultivate soybean on a small scale consequently innovation will probably be possible because every one in the system cultivated soybean probably at a subsistence level.

Table 1 also shows that most (60%) of the respondents in the enterprise components were small scale farmers while 30% of the respondents were medium scale farmers while only 5% were large scale farmers. This shows that farming of soybean in the Benue State soybean innovation system is mostly on small scale. This is probably because like other crops soybean cultivation in Benue state is still by small holders who employ traditional farming methods (BNARDA, 2000).

Table 1 also shows that Diffusion component respondents indicated majority (60%) facilitate soybean on a small scale while 40% of the respondents cultivate soybean on medium scale. This shows that most of the respondents were small scale producers of soybean. This is probably because soybean cultivation is not the primary job of respondents who were government extension staff of BNARDA or universities or higher institutions of learning in the state. The fact that all the respondents in the diffusion component were engaged in soybean cultivation is good ground for innovation to place in the innovation system.

Table 1 also shows that all (100%) of the respondents in the Research components were small scale farmers. This is probably because these respondents were scientists and probably plant it on a subsistence level and probably because of the growing importance of soybean milk as suitable for heart patients.

Table 1 finally indicates that majority (60%) of respondents in the infrastructure component plant soybean on a small scale while 40% cultivate soybean on a medium scale. This implies that most of the respondents plant soybean on a small scale. This is probably because since soybean is an important cash crop in Benue state government workers are also engaged in soybean cultivation, albeit, on a small scale.

The result shows that soybean is cultivated by most farmers in the state. This is probably because the Benue state government has a policy of encouraging civil servants to have at least a small backyard farm. This will probably stimulate innovation in the soybean innovation system.

Table 1: Distribution of Respondents by Personal and Socio-Economic Characteristics (n = 100)

S/No	CHARACT-ERISTICS	ACTOR COMPONENT									
		Demand		Enterprise		Diffusion		Research		Infrastructure	
		f	%	*f*	%	*f*	%	*f*	%	*f*	%
1	Age (Years)										
	21 – 30	5	25.00	10	50.00	2	10.00	2	10.00	6	30.00
	31 – 40	7	35.00	4	20.00	5	25.00	10	50.00	7	35.00
	41 – 50	3	15.00	3	15.00	9	45.00	7	35.00	3	15.00
	51 and above	5	25.00	3	15.00	5	25.00	1	05.00	4	20.00
2	Marital status										
	Single	3	15.00	4	20.00	1	05.00	5	25.00	4	20.00
	Married	13	65.00	16	80.00	19	95.00	13	65.00	16	80.00
	Divorced	1	05.00	0	0.00	0	0.00	1	05.00	0	0.00
	Widowed	3	15.00	0	0.00	0	0.00	1	05.00	0	0.00
3	Educational Status										
	No formal education	12	60.00	10	50.00	0	0.00	0	0.00	0	0.00
	SSCE/NCE/WASC	8	40.00	10	50.00	0	0.00	0	0.00	9	45.00
	HND/Bachelors degree	0	0.00	0	0.00	16	80.00	9	45.00	7	35.00
	Higher degree	0	0.00	0	0.00	4	20.00	11	55.00	4	20.00
4	Gender										
	Male	6	30.00	13	65.00	16	80.00	16	80.00	13	65.00
	Female	14	70.00	7	35.00	4	20.00	4	20.00	7	35.00
5	Farm Size										
	Small scale (≤ 1ha) *Akundu Aaan)*	17	85.00	12	60.00	12	60.00	20	100.00	12	60.00
	Medium (2 – 3 ha) (*Akundu pua – akundu pue kar ataan*)	3	15.00	6	30.00	8	40.00	0	0.00	8	40.00
	Large (4 – 5ha) *Akundu ikyundu – Akundu ikyunduikar ataan*)	0	0.00	2	10.00	1	05.00	0	0.00	0	0.00
	Very large (≥ 5ha) i.e. *Akundu ikyunduikar ataan*	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Degree of Interaction among Critical Actors in the Soybean Innovation System

Table 2 shows that actors in the Demand component (X = 4.26) and Enterprise Component (X = 4.02) exhibited high interaction with actors in other components. This implies that of the five components examined only actors in the two components, demand and enterprise exhibited high degree of interaction with actors in other components. There is a need to strengthen interaction of actors in the diffusion, research and infrastructure components. This is because innovation is a function of interactive learning of members of an innovation system (Feison, 2003).

Table 2: Mean Interaction Score of Actors in the Soybean Innovation System by Component (n = 100)

Actor component	Mean interaction score ($\bar{x}$)
Demand	4.26*
Enterprise	4.02*
Diffusion	2.61
Research	2.23
Infrastructure	2.24

* High interaction

Source: Field survey, 2006

Mapping the Relationship and Flow of Information (Interaction) Among the Critical Actors in the Soybean Innovation System

Data in Table 3 show that there was high interaction among actors in the Demand component and enterprise component (Total Interaction Score (TIS) = 111). There was also high interaction between demand and diffusion component (TIS = 69). There was high interaction between demand and enterprise components (TIS = 87). There was also high interaction between Research and demand (TIS = 98). Also there was high reciprocal interaction among actors in the Enterprise component and Demand component (Total interaction score = 104). The report also shows that there was high interaction among actors in the research component and actors in the enterprise components (TIS = 127). Also there was high interaction between Research and diffusion components (TIS = 73). Finally, there was high interaction between actors in the infrastructure component and demand component (TIS = 114), infrastructure component and enterprise component (TIS = 104) infrastructure and Diffusion components (TIS = 74) and infrastructure and research components (TIS = 75). This implies that there was high interaction among critical actors in demand, enterprise, research and infrastructure components which may probably produce innovation in the soybean innovation system. According to Kit (2005) innovation occurs as a result of interactive learning and is the result of numerous interactions between actors and institutions and these influences the innovative behavior of actors in the business concern.

Table 3: Distribution of total interaction score among actors in the Soybean Innovation System by Component of Actors

Component	Demand	Enterprise	Diffusion	Research	Infrastructure
Demand	-	111*	13	45	34
Enterprise	104*	-	36	9	6
Diffusion	69*	87*	-	30	16
Research	98*	127*	73*	-	57
Infrastructure	114*	104*	74*	75*	-

* High Interaction

Source: Field Survey, 2006

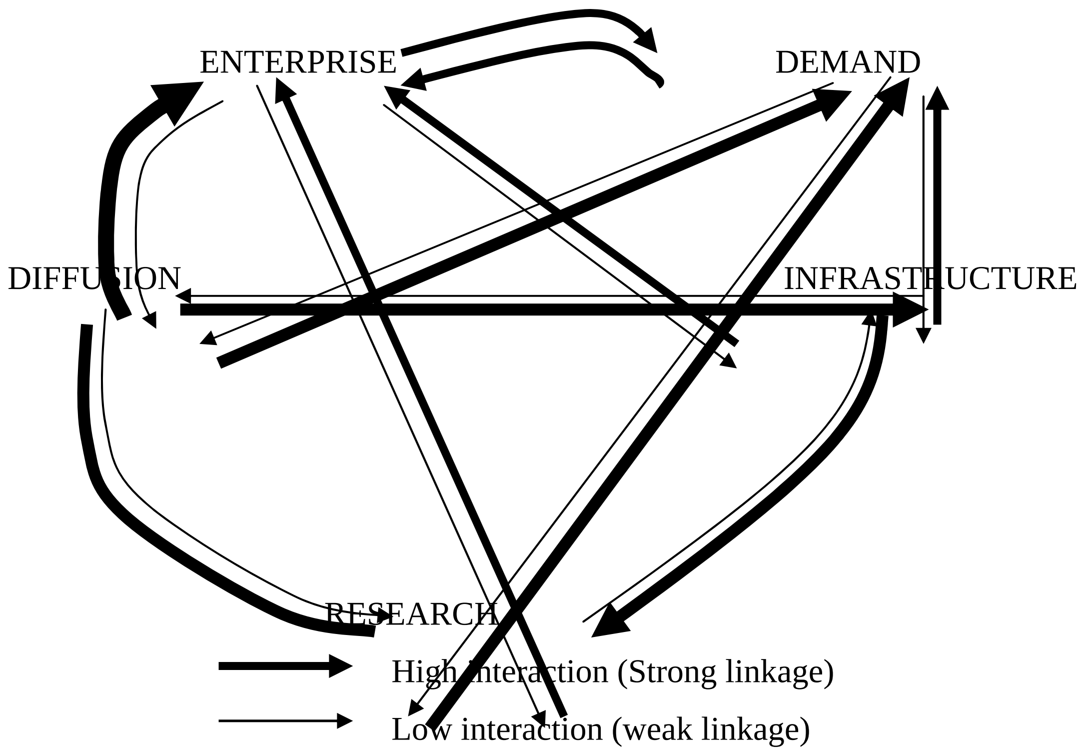

Fig.1: Actor Linkage Map Showing the Relationship and Flow of Information Among the Critical Actors

CONCLUSION AND RECOMMENDATIONS

As a result of the major findings of the study the following conclusion was drawn: The socio-economic characteristics of respondents examined indicate that the age range and proportion of young adult in the soybean innovation system was good to permit interaction among the soybean actor components that may result in innovation. Also, the high proportion of the married critical actors suggests that interactions among them may result n innovation. Also the enlightened population suggests a tendency towards innovation. There was poor reciprocal interaction among critical actors in the five components of the soybean innovation system in Benue State. The study also revealed that there was weak linkage among the critical actors in the soybean innovation system especially reciprocal interaction among actors in the components. Agencies involved in agricultural development, specifically, soybean enterprise should ensure interaction among the actors in the five components especially, the diffusion, research and infrastructure components.

This can be achieved by legislating policies for organizing regular stakeholder conferences, seminars and soybean farmers' fora with the mandatory attendance of all the stakeholders in the soybean innovation system. Policy makers and implementers of policy should make and implement policies to institute reciprocal linkage among the actors in the five components. This will be by legislation and funding implementation arrangement for a soybean extension strategy such as special program for intensive soybean production with specific roles created for all stake holders in the soybean innovation system. Also a revitalized soybean cooperative with funding arrangement for rotational meetings and the general improvement of private sector funding of soybean research and development to encourage linkage should be put in place.

REFERENCE

Abaagu, J. I, 2004. Speech by honorable Commissioner of Commerce and Industries on the opening of the 2004 Trade Fair at Makurdi.

Ayoola, G. B, 2001. *Essays on the Agricultural Economy: A Book of Readings on Agricultural Policy and Administration in Nigeria*: 1, Ibadan, Nigeria. TMA Publishers: 1 – 5.

Benue State Agricultural and Rural Development Authority, BNARDA, 2000. Agricultural Production recommendation for Benue State Extension *Bulletin:* 3.Benue State Government, 2002, Diary.

CTA/UNU - INTECH/KIT, 2005. Analyzing the Agricultural Science and Technology and Innovation Systems. *African sub-regional workshop. West and Central Africa* held at Abia State, Nigeria, 8th – 12th August, 2005.

Diyamett, B. D, 2004. The Concept of Technological Innovation: Theoretical Overview and Some Practical Implications for Africa. In: B. L. M. Mwamila, L. Trojer, B. Diyamett and A. K. Temu (Eds.): *Innovation systems and innovative clusters in Africa*. Proceedings of Regional Conference held on 18th – 20th February at Bayamoyo, Tanzania PP. 130 – 151.

Ernst, D. I. Ganiatos and L. Mytelka, 1998. Technological capabilities and export success in Asia. London, Routledge.

Federal ministry of Agriculture, water resources and Rural Development, FMWRRD, 1984. A perspective plans for Agricultural Development in Nigeria, 1990-2005. Abuja. Federal Ministry of Agriculture, water resources and Rural Development.

Feison, .S, 2003. National Innovation System. Overview and country cases. Center for science, policy and outcomes. Regional Workshop: Analyzing the Agricultural, Science, Technology and Innovation Systems (ASTI). Held at Abia State University, Nigeria. August 8th -12th 2005.

Francis, A. J, 2005. National Innovation System. (CTA), the Netherlands presented at the Regional Workshop: analyzing the Agricultural, Science Technology and Innovation Systems (ASTI)". Held at Abia State University, Nigeria. August 8th – 12th.

Johnson, A. and Jacobsson, S, 2000. The emergence of growth industry: a comparative analysis of the German Dutch and Swedish wind Turbine Industries Mimeo. The Department of Industrial Dynamics, Chalmers University of Technology, Sweden (To be published in the Schumpter Conference proceeding).

Konin Klijk Instituut Vor de tropen, KIT, 2005. Agricultural Innovation System Multi-stakeholder processes and client-oriented delivery of agri-services: Practical Experiences of the Royal Tropical Institute with facilitating rural innovation processes in Africa Development Policy and Practices". Amsterdam. February 2005.

Lawal, W. L.; M. O. Chisonum and Ater, P.I, 2005. Gross Margin analysis of Indigenous Processing of Soybeans in Benue State. In: C.P.O Obinne (Ed): *Readings on indigenous processing, storage and marketing for poverty reduction in Nigeria*: 123 – 131.

Mwamila, B.L.M, Diyamett, D, Tebu, A. K. Mytelka, L. and Trojer L, 2004. Major Observations, lessons and recommendations. In: B.L.M. Mwamila, Tropier L, B. Diyamett, A. K., Temu (Eds): *Innovation system and innovative clusters in Africa* Proceedings of Regional Conference on innovation systems and innovative clusters in Africa: 79 – 92.

National Resources Institute, NRI, 2005. Working with farmers to strengthen innovation system. Nri–Org. University of Greenwich.

National population commission, NPC, 2006. Nigeria population census provisional result 2006. Abuja. National population commission.

Niosi, J, 2002. National systems of Innovations are x-efficient (and x-effective) while some are slow learners. *Research policy 3*.

Organization for Economic Cooperation and Development, OECD, 1997. National Innovation Systems.http://www.oecd.org/home

Oyelaran – Oyeyinka, B, 2004. Building innovation clusters: The role of learning and local Capabilities. In: Mwamila B.L.M., L. Trojer, B. Diyamett, A. K. Temu (eds): *Innovation systems and clusters in Africa*. Proceedings of Regional conference held on 18 – 20th at Bagamoyo, Tanzania: 192 – 233.