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# Assessment of the Technological Capabilities of Climate Change Actors in Agricultural Innovation System in Southeast Nigeria

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**Abstract**

Effective climate change adaptation and mitigation requires actors who have acquired requisite technological capabilities to efficiently use climate change equipment/information to counter the ravaging impacts of climate change. Technological capability has seven categories namely: investment, production, minor change, major change, learning, strategic marketing and linkage capabilities. The study assessed the technological capability of climate change actors in agricultural innovation system in Southeast Nigeria. Five sub-systems (education, technology transfer, policy, research and farmer) that constitute an agricultural innovation system were identified and the staff in each system served as actors. Statistical analyses of the data show that all the actors except the research sub-system actors lack investment capability in equipment (85%) and human resource development (60%). Traditional learning and linkage capability by which firms enhance their competence were strong among all the actors. Funding/manpower (0.959), organizational (0.785) and weak policy (0.916) related factors influenced the development of technological capabilities of the actors. The study recommends that Government and non governmental agencies like United Nations Development Programme and World Bank should provide adequate funding to the actors in order to enhance the development of their technological capabilities.

**Keywords:** climate change, technological capabilities, actors, agricultural innovation system, southeast Nigeria

## 1. Introduction

In Nigeria, there is glaring evidence of climate change (cc) and its impacts are already occurring and touching lives (Medugu, 2009). The declining rainfall in areas prone to desertification in northern Nigeria is causing increasing desertification; people in the coastal areas of Nigeria who used to depend on fishing have seen their livelihoods destroyed by the rising waters (Medugu, 2009). In the southeast, empirical evidences of the unpleasant impact of cc abound; these include increased cases of flooding and numerous gully erosion sites which have resulted to loss of farmlands, farm stead, biodiversity etc (Agwu and Okhimamhe, 2009). The gradual fading away of the 2 to 3 weeks traditional break in rainfall ‘‘August break’’ and its replacement by 2 to 3 days break in the eastern humid zone of Nigeria is also attributed to climatic change (Chineke et. al. 2010). Just recently, many parts of Southeast Nigeria and its borders close to major rivers in Anambra, Imo and Kogi States were submerged by flood during the raining season between the months of July and October, 2012. This caused a great national concern as farmers' homes and farms were submerged. It also disrupted transportation and business activities, even in the Federal capital territory, Abuja.

For effective adaptation to cc, it is pertinent that cc actors should acquire requisite technological capabilities (TCs). TCs is the skills (technical, managerial, organisational) and knowledge that enable firms (farm or actors) to efficiently use equipment/information and improve technology. Ernst, Mytelka and Ganiatsos (1994) defined it as the variety of knowledge which firms need so that they can acquire, assimilate, use, adapt, change and create technology.

TCs are built through interactions both within the firm (farm) and with external actors (Malerba, 1992). Following this, TCs are the result of interactive learning processes and linkages between a number of actors such as firms, universities and research centers through collaborations both complementary and competing ones (Bell and Pavitt, 1993; Szogs and Mwantima, 2010). TCs cover a wide spectrum of technical efforts undertaken by firms/actors. Consequently, to make their analysis manageable, TCs are commonly categorized into six, namely: investment capability, production capability, minor change capability, major change capability, strategic marketing capability and linkage capability (Ernst *et al.* 1994). However, Biggs, Manju and Srivastava (1995) in their study identified learning capability/mechanism as a seventh category.

The interactive learning processes and linkages that result due to TCs do not occur in a vacuum, rather, they occurs within an innovation system. An innovation system is defined as a complex, open and dynamic human activity system in which actors (individuals, groups, and organisations) apply their minds, energies and resources to innovation in a particular domain of human activity (Daane, 2009). Innovation systems do not exist ‘out there’ as objective entities or realities – they only exist ‘in the minds of those who define them’, i.e. as social construct, or as a heuristic device for analytical purposes. An implication of this definition is that innovation systems are defined in relation to a particular domain of human activity. Thus, one can for example define a system of innovation in a specific commodity, value chain or business cluster, or in specific (agro) eco- or farming systems (Daane, 2009), hence, the agricultural innovation system.

An agricultural innovation system (AIS) is defined as a set of organizations and individuals involved in generating, disseminating, adapting and using knowledge for socio-economic significance and the institutional contexts that govern the way interactions and processes take place (Hall, Bockett, Taylor, Sivamohan *et al.* 2001). In the AIS, the following sub-systems are identified- education, policy, technology transfer, research and farmer. The workers/staff in each sub-system are regarded as actors.

As the challenges such as those posed by cc grow, technologies, knowledge and practices that simultaneously increase productivity, resilience to cc (i.e. cc adapatation) and green house gases reduction (cc mitigation) are needed (Alcadi, Mathur and Remy, 2009). According to Oruwari, Jev and Owei, (2002), it is crucial to acquire and strengthen TCs to produce technologies, policies and synergies needed to effectively address cc. Inter alia, for actors to respond effectively to cc, they must have the requisite TCs (skills and knowledge) required and the learning ability to upgrade these when needed. Because capabilities are driven by knowledge acquired through linkage and learning, the different actors in the AIS must have the capabilities to learn and share lessons for scaling up successful strategies for effective cc adaptation and mitigation. Hence, there is need to address the following research questions- Which Tcs exist among cc actors in southeast AIS? Which TCs are lacking and why? Who among these actors are involved in the development of these capabilities? Based on these, the study aims at determining the TCs of cc actors in AIS in Southeast Nigeria, to see how these capabilities affect their activities, identifies technological gaps/needs and how they can be corrected through policy instrument. Specifically, the objectives were to: (i) examine the existing cc TCs (investment, linkage and learning) of the actors and (ii) ascertain the factors that influence the development of cc TCs of the actors.

## 2. Materials and methods

### *2.1 Area of study*

The study was carried out in Southeast Nigeria. The Zone is located between Latitudes 04° 30′ N and 07°30′ N and Longitudes 06° 45′ E and 08°45′ E (see Fig. 1). It covers an area of 29,908 square kilometres with a population of about 16,381,729 (Federal Republic of Nigeria. (2007). The area comprises the geographical location of the following states: Abia, Anambra, Ebonyi, Enugu, and Imo. It is bordered by Kogi and Benue States to the north, Cross River to the east and Delta to the west. The language of the people is Igbo language and the commonest religion is Christianity. Climate of the southeast Nigeria can generally be described as tropical with two clear identifiable seasons, the wet and dry seasons. It lies within the tropical region with early rainfall usually in January/February with full commencement of rainy season in March and stopping in November of each year. The dry season lasts between four to five months. The highest rainfall is recorded from July to October with little break in August. The average highest annual rainfall is about 1952 mm. The temperature pattern has mean daily and annual temperatures as $28^{o}$ C and $27^{o}$ C respectively.

It is primarily an agricultural zone. The soils of the region are largely sandy, mostly loose and porous. The commonest crops grown in the zone include cassava, yam, cocoyam, maize, ugu (*Telferia occidentalis)*, plantain/banana, oil palm and coconut while major animals reared include goat, sheep, poultry etc. The region is experiencing devastating impact of climate change which is well represented in the frequent cases of flooding and increased number of gully erosion sites on farmlands (see Fig 2).

### *2.2 Population and sampling procedure*

All climate change actors (i.e. farmers and staffs of faculties/universities of Agriculture, Agricultural Development Programme, Ministry of Agriculture and research Institute) in AIS in Southeast Nigeria formed the population. Five sub-systems (education, technology transfer, policy, research and farmer) that constitute an AIS were identified and the staff in each system served as actors. Three states (Abia, Anambra and Enugu) were purposively selected because of high incidence of cc related disasters (e.g. farmlands that are already eroded by gully erosion and abnormal flooding events).

For the farmer sub-system, simple random sampling was used to select forty (40) farmers from Umuahia, Aguata and Enugu North agricultural zones in Abia, Anambra and Enugu States respectively. In the Policy sub-system, twenty four (24) Directors were purposively selected from both state and federal ministries of Agriculture in Abia, Anambra and Enugu States. For the research sub-system, twelve (12) researchers at the National Root Crop Research Institute (NRCRI), Umudike were randomly selected. Twenty one (21) staff in the Agricultural Development Programme (ADP) were randomly selected to represent the technology transfer sub-system. For the education sub-system, seventy nine (79) academic staff were selected from both state and federal universities/faculties of Agriculture in the three States, namely: Abia State University and Micheal Okpara University of Agriculture, Umudike for Abia State, Anambra State University and Nnamdi Azikiwe University for Anambra State, Enugu State University of Science and Technology and University of Nigeria for Enugu State. These gave a total sample size of one hundred and seventy six (176) respondents.

*2.3 Instrument for data collection and measurement of variables*

Both interview schedule and structured questionnaire were used for data collection. Interview schedule was used to elicit information from actors in the farmer sub-system while copies of questionnaire were distributed to the actors in the other four sub-systems. The questionnaire was divided into two sections. Section 1 was devoted to information on TCs of the respondents while section 2 investigated factors that influenced the development of TCs of the actors.

Objective 1: sought information on TCs of the respondents namely: (a) Investment capability: investment capability is represented by project execution activities including feasibility studies, equipment search, assessment of equipment, employee training. Hence, investment could be investment in machinery (equipment) or human resource development. All respondents except the farmer were asked if they have investment capability or not and if yes to itemize investment their organizations have made in terms of equipment and human resources within the last three years as it regards cc. For human resources development, they specified the number of staff with their qualifications, the type of training on cc the staff have embarked on, the duration of such training and amount invested into such trainings. Farmers identified investment at the farm in terms of additional farm inputs, increase in farm area, purchase of new crop varieties or livestock, purchase of both processing and storage facilities. (b) Linkage capability: innovation is fundamentally a process of learning through knowledge and information flows that result through interaction, therefore all the actors/respondents were asked to indicate 'yes or no' if they have linkage capability or not, what their traditional practices with regard to forming linkages were? Do they form linkages and if so with what kinds of actors? Respondents were also required to indicate the number of other actors they have close cooperation (linkage) with. (c) Learning capability: All the actors responded to such questions as- Do you have any built-in mechanisms for acquiring new information and for learning through feedback? Does your institution provide learning, is there evidence that the actors are learning, have learned and unlearned? Describe what you have learnt over the years with regards to climate change.

Objective 2: factors that influence the TCs development of the actors. The respondents were asked to respond to possible factors using a four-point Likert-type scale of "to a great extent (4)", "to some extent (3)", "to a little extent (2)" and "to no extent (1)". The mean value of 2.5 was used to determine the factors. Variables that have a mean value of 2.5 and above were considered as factors that influence TCs development and those below 2.5 were not. Data were further subjected to exploratory factor analysis procedure using the principal factor model with varimax in grouping the influencing factors. Only variables with loadings of 0.4 and above (10% overlapping variance) were used in naming the factors while variables that loaded high in more than one factor were discarded (Comrey, 1962).

*2.4 Data analysis*

Information on TCs of respondents (objectives 1) was analysed using percentage. Information on factors that influenced the development of cc TCs (objective 2) was analysed with exploratory factor analysis. Version 16.0 of the Statistical Package for the Social Science (SPSS) software was used for the analysis.

## 3. Results and Discussion

3.1 Investment capability

*3.1.1 Investment capability of farmer sub-system actors*

Investment capability is represented by project execution activities including feasibility studies, equipment search, assessment of equipment, employee training. Hence, investment capability was either investment in equipment or human resource development. Figure 3 depicts that 25.0% of the respondents claimed they have investment capability in equipment while 30.0% said they have capability in human resource development. This finding indicates that majority of the farmers have no investment capability in terms of both equipment and human resource. Lack of investment capability implies that these farmers are not adequately positioned to tackle the negative impact of climate change.

*3.1.2 Investment capability of research sub-system actors*

Figure 3 indicates that the respondents have investment capability in equipment (85.0%) and human resource development (60.0%). This result shows that there is abundant investment capability in the research sub system. Abundant investment capability in the sub-system implies they are already empowered in conducting cc related researches.

*3.1.3 Investment capability of policy sub-system actors*

Figure 3 shows that none (0%) of the respondents have investment capability in equipment while 20% said they have capability in human resource development. This result indicates that investment capability is grossly inadequate in the policy sub-system. The policy sub-system has the mandate to take actions (e.g. legislation, regulations and incentives) to support changes in socio-economic systems in order to reduce vulnerability to climate variability and climate change (Burton, Huq, Lim, Pilifosova *et.al*, 2002). Without adequate capability in investment, policy sub-system actors may not be capable to meet this mandate.

*3.1.4 Investment capability of technology transfer sub-system actors*

Forty (40) percentage of the actors reported that they have acquired investment capability in equipment (fig 3). It also shows that 25.0% have capacity in human resource development. The result shows a poor investment capability by technology transfer sub-system actors. Absence of investment capability among these actors implies that they cannot meet up with the role of bringing innovation (including cc innovation) to farmers.

*3.1.5 Investment capability of education sub-system actors*

Figure 3 shows that none (0.0%) of the actors have investment capability in equipment. The Figure also shows that 15.0% have investment capability in human resource development. This result shows a deficiency in the investment capability among university staff. University education usually provides leadership in research, training and innovation, often responsible for sustainable development of which climate change adaptation is a component (Committee on Building Trans-disciplinary Capability at the University of Nigeria, UNN_ATPS, OSF Project (2011). This result therefore implies that with regards to cc, the university which is supposed to be the place where adaptation and mitigation options are taught may not be in a position to transfer skills to their students and provide the desired leadership in research, training and innovation.

3.2 Linkage capability

Figure 4 depicts percentage distribution of actors based on linkage capability. It shows that 80.0% of the farmer sub-system actors said they have capability to link with other actors. Ninety five (95) percent of research sub-system actors claimed they have linkage capability. The figure also shows that 85.0% each of policy, technology transfer and education sub-systems actors said they have linkage capability. This result shows abundant linkage capability among the actors. This implies that learning could take place when actors link and interact in different context which are socially embedded within institutions. This interaction foster knowledge flow, either old knowledge used in new ways or new knowledge diffused as innovation (Oyelaran-Oyeyinka, 2004). System interaction otherwise known as linkage capability is an important asset which is composed of knowledge, skill and experience to engage other actors in the process of production of innovation.

3.3 Learning capability

Figure 5 shows percentage distribution of actors based on if they have learning capability while Table 1 shows what the actors have actually learnt. The result shows that 60.0% of the farmers said they have learnt quite a number of things with regards to cc. Over half of the research respondents (60.0%) said they have also learnt a lot with regards to cc. The Figure also shows that 55.0%, 65.0% and 70.0% of policy, technology transfer and education sub-systems actors respectively have learning capability. The result indicates adequate learning capability across the actors. TCs generally involve learning and the accumulation of new knowledge, and also the integration of behavioural, social and economic factors, as adapted to specific contexts (Lammarino, Piva, Vivarelli, and Von Tunzelmann, 2009). This result implies that these actors posses quite a reasonable learning capability which will help them be able to adopt new technologies in order to cope with the challenges of cc. The finding agrees with Bangens and Laage-Hellman (2002) where majority of the respondents have adequate learning capability that enabled them to be competitive.

*3.3.1 Learning capability of farmer sub-system actors*

Table 1 shows what the farmers have learnt. Majority (70.0%) of the respondents learnt adaptation measures, mitigation measures, impact on crop production and impact on animal production. It also shows that half (50.0%) of the respondents have learnt the causes of cc and the indicators of cc. Forty-five (45) percent each have also learnt the impact of cc on health and water resources whereas 30.0% have learnt the concept of cc. The road to TCs building is learning; hence the result implies that the respondents are already building capability since there is abundant learning capability.

*3.3.2 Learning capability of research sub-system actors*

Entries in Table 1 show that majority (90.0%) have learnt the indicators of cc. It also shows that 85.0% have learnt the causes of cc, 80% have learnt the concept of cc while 60.0% each have learnt adaptation measures, mitigation measures, impact on health, impact on crop production, impact on animal production and impact on water resources. The Table also shows that 40.0% have learnt the need for curriculum change and the need for new teaching/research methods. TCs are outputs of adaptive learning processes that are sustained through a variety of external connections and sources for innovation (von Tunzelmann and Wang, 2003).

*3.3.3 Learning capability of policy sub-system actors*

Majority (60.0%) of the actors have learnt the concept of cc and indicators of cc (Table 1). The Table also shows that 50.0% each of the respondents have learnt the causes of cc, adaptation measures, mitigation measures, impact on health, impact on crop production, impact on animal production and impact on water resources. This result implies that there is no learning in the area of policy making.

*3.3.4 Learning capability of technology transfer sub-system actors*

Entries in Table 1 show that majority (70.0%) learnt the impact of cc on crop production, 60.0% each have also learnt the concept of cc, adaptation measures, mitigation measures, indicators of cc, impact on health, impact on animal production and impact on water resources while 50.0% have learnt the causes of cc.

*3.3.5 Learning capability of education sub-system actors*

Majority (80.0%) of the respondents have learnt the concept of cc and the causes of cc (Table 1). The Table also shows that 70.0% each of the respondents have learnt adaptation and mitigation measures, impact on health, crop production, animal production and water resources. Fifty-five (55) percent and 50% of the respondents have also learnt the need for curriculum change and introduction of new teaching methods respectively. The high (70.0%) learning capability among the education sub-system actors is anticipated because given their educational profile, they are supposed to have learnt a lot and pass same to other actors if there is an effective linkage.

3.4 Factors influencing the development of technological capability

Table 2 shows varimax rotated factor on factors influencing the development of technological capability. Based on variable loading, three factors were identified and named. Factor one was named funding/manpower related factors, factor two was named organizational related factors while factor three was named weak policy related factors.

Entries in the Table show that factors that loaded high under funding/manpower related factors (factor 1) were poor funding to research (0.959), poor funding to teaching (0.770), lack of manpower (0.471), unavailability of technology (0.495), unavailability of equipment (0.567), lack of training opportunity, (-0.652), lack of competent staff i.e. climate change experts (0.760). Lack of skilled human resource has been identified as important factors for the low-level of technological capability development in many firms in developing countries (Panda and Ramanathan, 1997). Poor funding will not allow actors to invest in training, research and development, or state-of-the-art technology acquisition. Unavailability of equipment needed for teaching and research in the education sub-system will imply that the university will be incapable of transferring needed climate change adaptation skills to her students and the surrounding communities. With adequate funding into teaching/research, teachers/researchers will have enough machines and other technology needed for their researches and this will bring technological change. Technological change itself stimulates capability accumulation and will directly and indirectly enhance teachers/researchers capabilities.

Culture of firm (0.482), bureaucracy (0.755), poor remuneration (-0.689), poor motivation (0.785) and lack of interaction between actors i.e. poor linkage (0.740) loaded high under organizational related factors (factor 2) (Table 2). Interaction between actors will allow them swap information and enhance learning (Dominguez and Brown, 2004). Such learning will permit the actors to accumulate TCs in adapting to the challenges of cc. Lack of interaction hence implies there will be no opportunity of learning and development of cc TCs. This inability to learn or link could retard efforts towards addressing the problems of cc.

Table 2 equally shows the factors that loaded high under weak policy related factors (factor 3) as poor fiscal government policies (0.453), policy dynamics (0.521), poor access to knowledge and information on new technologies (0.475), poor government commitment to climate change issues (0.916) and lack/weak legal framework (-0.470). Government can be instrumental in stimulating technological capability enhancement through a number of fiscal incentives (Porter, 1980). Aderemi, *et. al* (2009) maintained that government has the roles of setting priorities, participating and enacting laws that could enhance TCs development and accumulation. TCs of farmer actors could be enhanced if government makes it a law that all financial institutions (banks) must give low interest loans and demand very affordable collateral from farmers.

However, inadequate finance/credit loaded high under funding/manpower (0.521) and organizational (0.470) factors. Subsequently, it was not considered in naming the extracted factors.

## 4. Conclusion and Recommendations

All the actors expect the research sub-system actors lacked investment capabilities. This indicates that the actors are not adequately positioned to tackle the negative impact of cc. All the actors showed strong learning and linkage capabilities. The strong learning and linkage capabilities will help the actors to exchange views about cc and also learn and upgrade their knowledge on the issue. Funding/manpower factors (factor 1) that influence the development of technological capability are poor funding to research and teaching, lack of manpower, unavailability of technology and equipment, lack of training opportunity and competent staff i.e. climate change experts.

It is recommended that Government and Non-governmental bodies should aid the actors to acquire investment in machines and in human resource. For instance, farmers should be helped to acquire machineries needed for irrigation and also the capability to invest in machineries. This will help them overcome the problem of unpredictable rainfall pattern which is aggravated by cc. Similarly, universities could be financially supported to buy equipment needed for teaching/research for cc. They should also be trained to acquire necessary training needed in handing the equipment.

Unavailability of technology needed for proper adaptation to cc was one of funding/manpower related factors which influenced the development of TCs. To provide solution to this, government should make it a policy issue that adequate technology/information gets to the actors such as providing quarterly meteorological information and research-oriented adaptation strategies to the farmer actors.

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Figure 1. Map of Nigeria Showing Study Area
(Modified after http://en.wikipedia.org/wiki/States_of_Nigeria)

 

Figure 2. Gully Site at Ukana, Enugu State

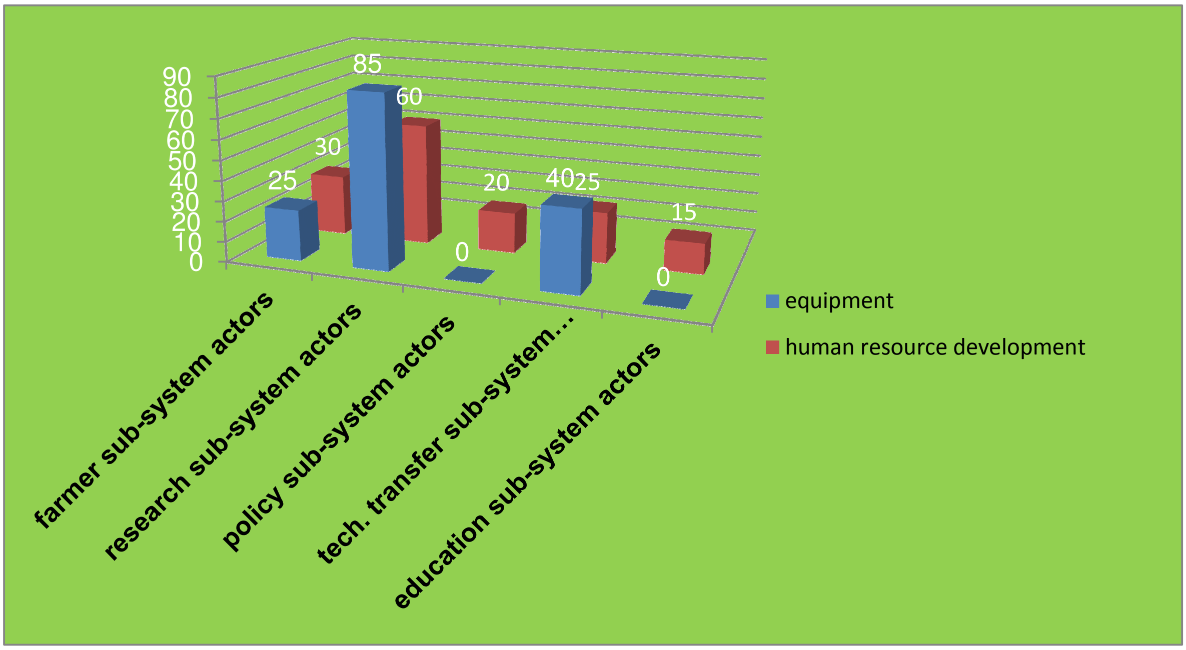


Figure 3. Bar Chart Showing Percentage Distribution of Actors Based on Number that Has Investment Capability

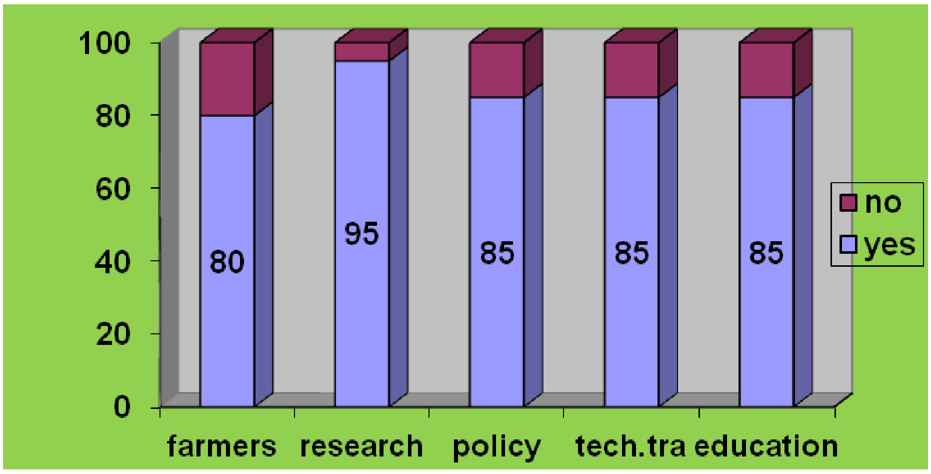


Figure 4. Bar Chart Showing Percentage Distribution of Actors Based on Number that Possess Linkage Capability

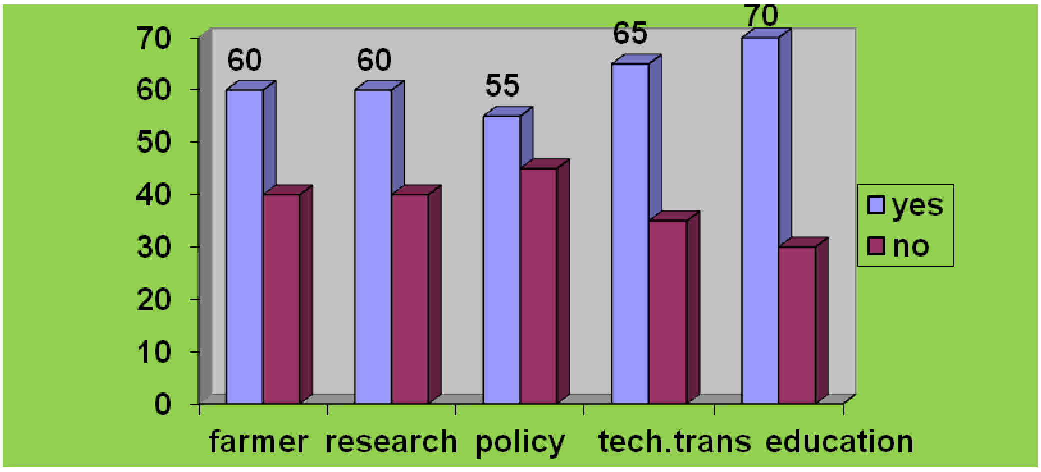


Figure 5.Histogram Showing Percentage Distribution of Actors Based on Number that Have Acquired Learning Capability

Table 1. Percentage Distribution of Actors Based on What Have Been Learnt with Regards to Climate Change.

| Learning | Farmers n=40 (%) | Research n=12 (%) | Policy n=24 (%) | Tech. Transfer n=21 (%) | Education n=68 (%) |
|---|---|---|---|---|---|
| Concept of climate change | 30.0 | 80.0 | 60.0 | 60.0 | 80.0 |
| Causes of climate change | 50.0 | 85.0 | 50.0 | 50.0 | 80.0 |
| Adaptation measures | 70.0 | 60.0 | 50.0 | 60.0 | 70.0 |
| Mitigation measures | 70.0 | 60.0 | 50.0 | 60.0 | 70.0 |
| Indicators of climate change | 50.0 | 90.0 | 60.0 | 60.0 | 80.0 |
| Impact on health | 45.0 | 60.0 | 50.0 | 60.0 | 70.0 |
| Need for curriculum change | - | 40 | - | - | 55.0 |
| Need for new teaching/research method | - | 40 | - | - | 50.0 |
| Impact on crop production | 70.0 | 60.0 | 50.0 | 70.0 | 70.0 |
| Impact on animal production | 70.0 | 60.0 | 50.0 | 60.0 | 70.0 |
| Impact on water resources | 45.0 | 60.0 | 50.0 | 60.0 | 70.0 |

Source: Field survey 2012

Table 2. Varimax Rotated Matrix of Factors that Influence the Development of Technological Capabilities

| Influencing factors | Factor 1 | Factor 2 | Factor 3 |
|---|---|---|---|
| Poor funding to research | **0.959** | 0.367 | 0.359 |
| Poor funding to teaching | **0.770** | 0.280 | -0.250 |
| Lack of manpower | **0.471** | -0.344 | 0.209 |
| Unavailability of technology | **0.495** | 0.319 | 0.301 |
| Unavailability of equipment | **0.567** | 0.123 | 0.279 |
| Size of firm | -0.329 | 0.026 | 0.319 |
| Culture of firm | 0.390 | **0.482** | 0.254 |
| Firm organisation strategy | 0.215 | -0.191 | 0.375 |
| Lack of training opportunity | **0.652** | 0.254 | 0.354 |
| Lack of competent staff(climate change experts) | **0.760** | 0.297 | 0.191 |
| Bureaucracy/organisational bottleneck | 0.351 | **0.755** | 0.250 |
| Poor fiscal government policies | 0.252 | 0.362 | **0.455** |
| Policy dynamics | 0.344 | 0.289 | **0.521** |
| Farmer's conservatism | 0.301 | 0.233 | 0.280 |
| Market forces | 0.312 | 0.375 | 0.148 |
| Poor access to knowledge and information on new technologies | 0.008 | 0.321 | **0.475** |
| Poor remuneration | 0.371 | **0.689** | 0.362 |
| Influence of donor agencies | 0.364 | 0.254 | 0.301 |
| Poor government commitment to climate change issues | 0.258 | -0.098 | **0.916** |
| Poor motivation | 0.208 | **0.785** | 0.206 |
| Lack of interactions among actors/poor linkage with other actors | 0.287 | **0.740** | 0.328 |
| Inadequate finance/credit | 0.521 | 0.470 | 0.365 |
| Lack /weak legal framework | 0.367 | 0.319 | **0.470** |

*Note:* **Factor 1**= funding/manpower related; **Factor 2=** organizational related; **Factor 3:** weak policy related factors.
Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization (loading at .4 and above)
Bold type is used to highlight high factor loads.
Source: Field survey, 2012.