# LINKING LOCAL INSTITUTIONAL COORDINATION TO CLIMATE CHANGE ADAPTATION IN THE AGRICULTURE SECTOR: INSIGHTS FROM MKUSHI DISTRICT, ZAMBIA.

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## ABSTRACT

Global climate adaptation plans risk resulting to climate maladaptation and shocks when there are inapt institutions. Adaptation strategies require multidisciplinary approach from all sectors with various institutions playing vital roles in the implementation of sustainable locally adaptable and results oriented projects. For decades, various governments, development practitioners and international organizations have made concerted efforts in tackling large scale climate events. These stern initiatives form part of Millennium Sustainable Development Goals (SDGs), specifically SDG 13 meant to combat climate change. This study sought to Examine the effectiveness of local climate change institutional coordination to climate change adaptation. The study used a mixed method approach based on informants' knowledge and experience to examine the effectiveness of adaptation strategies in Musofu and Nkumbia areas of Mkushi. The Chi-square was employed for the analysis of quantitative data and thematic analysis of the qualitative data. Examining the effectiveness of institutional climate change coordination for adaptation and mitigation is one of the key components of achieving net zero or below $2^{\circ}$ C which is often overlooked, hence, the need for this study. Results from this study show that local climate change institutional coordination for adaptation are not effective and sustainable due to the absence of NGO support, and lack of financial support to the ministry of agriculture, lack of adaption capacity and institutional failure to mobilize funds. This study serves as an insight information for relevant stakeholders on critical areas, which ought to be prioritized to reduce the locals' vulnerability to climate hazards. Further research is needed on the influence of funding on local institutions that co-ordinate climate change adaptation activities. Conclusions and recommendations can assist in formulating policies to improve CCA.

## 1.0 INTRODUCTION

Climate change affects every sector of the global economy and slows down socio-economic development. The need for adaptation and mitigation measures to avert the impacts on human, infrastructure, and economic sectors is a recurring subject of global discourses (Hovik et al., 2015). Climate-induced hazards such as droughts, floods and extreme temperatures have increased in frequency and intensity over the past few decades and have adversely affected the food security and sustainable livelihoods of the rural communities (GRZ, 2016). The impacts of climate change are mostly felt by the vulnerable local communities due to their inability to adapt. The IPCC (2015) affirms that the inadequate climate change financing to the least developing countries has triggered failures in mitigation and adaptation strategies as these countries often lack technological skills and funds to implement their adaptation plans and strategies (Agrawal, 2012).

Global climate action plans risk resulting to climate maladaptation and shocks when prudent measures are inept. Adaptation strategies require multidisciplinary approaches from all sectors with periodic monitoring and evaluation which are carefully planned, locally adaptable and results oriented. This can be achieved through well- coordinated institutions which presents opportunities for planning and implementing public climate change adaptation strategies, dependent on effective institutional coordination. The local communities lack prudent measures to enhance their capacity of areas to overcome bottlenecks, which derail the effectiveness of nationally initiated adaptation mechanisms. Actions to reduce sensitivity through livelihood diversification has often failed in developing countries, as many local people are trapped by poverty, lack of skills, access to capital and other critical resources. It is of great importance that, key principles embedded in the approach of linking local climate change institutional coordination to climate change adaptation takes into account stakeholder participation and consultation at various levels, promotion of synergy of indigenous or traditional and scientific knowledge at different stages of formulation and implementation of policies, plans, programs and projects. By doing this it makes the local communities be able to adapt as climate change adaptation is locally shaped.

Developing countries need to strengthen national institutions' systems to manage climate change coordination of which the assessment processes of how adaptation activities are carried out have always been not well linked to local climate change institutional coordination for decision-making. Therefore, better systems to track institutional climate change adaptation and efficiency as the financing trickle in whether at local, provincial or national may significantly lead to strengthening mechanisms for climate change adaptation through sound local Institutions (Jesse et al., 2014).

## 1.1 PROBLEM STATEMENT

The reoccurrence of droughts, low rainfall and high temperature has led to the communities in Mkushi to be vulnerable as they have limited capacity to adapt. Sichingabula (1998) reported that Mkushi has 47 percent chance of reoccurring of drought, high temperature, and low rainfall. lMubanga and Umar (2014), attested to the fact that apart from Southern Province of Zambia, Central Province is prone to droughts and low rainfall. In Zambia, institutions that are expected to play a key role in managing and coordinating climate change adaptation efforts in local areas are weak. This is due to the lack of explicit or clear institutional arrangements that encourage the participation of the community and other institutions in the coordination of climate change activities (Cycle Programme Report, 2018). The IPCC, (2012) reported that for most Third World states, institutional frameworks still fall far short of the requisite capacity building, are under-resourced and fragmented to effectively coordinate implemented initiatives.

The underfunding to institutions presents a challenge to effectively coordinating climate change projects and this makes local institutions fail to coordinate climate change adaptation activities as resources are scarce (UNDP, 2014). The limited resources allocated to climate change, coordinating institutions in Zambia limits their effectiveness. For example, from the beginning of 2019 to the time of data collection for this study in January 2020, the Climate Change Department, which is responsible for coordinating climate change activities in Zambia with few or no personnel in other districts especially at grass root level, had not received government funding to improve its operations. The lack of funding makes them highly ineffective in carrying out their coordination activities. In addition, institutions may lack skilled staff in climate change-related activities, making it inefficient. Jackson (2013) said that the coordination of institutions can be heightened if

there are inspectors in monitoring the climate change activities from the national to the local level in order to improve efficiency and potency.

There is a general lack of cooperation and coherence among different sectors and departments dealing with climate change issues which may be caused by lack of trained human resources and unqualified personnel coordinating climate change activities (Funder *et al*., 2015). The multi-sectoral nature of impacts and adaptation to climate change calls for the promotion of coherence and synergies between institutions and local communities as they are the most vulnerable (GRZ, 2016). At times the seeming breakdown in cooperation is due to the fact that the roles of institutions in the coordination of multi-sectoral adaptation related to climate change are unclear.

## 1.2 Theoretical underpinnings

The study is premised on the institutional theory because institutions have to interact with their surrounding social system structure and operate in the society. Meyer and Rowan (1997) affirm that the institutional theory is a theory on the deeper and more resilient aspects of social structure. It considers the process by which structures, including schemes, rules, norms, and routines become established as authoritative guidelines for social behavior. DiMaggio and Powell (1995) explained that different components of institutional theory explain how elements are created, diffused, adopted, and adapted over space and time and how they fall into decline and disuse. The transmission of the institutions' systems is of various types including; Symbolic, relational systems, routine, and artifacts, even though they operate at different levels of jurisdiction, from the world system of localized interpersonal relationships to incremental and discontinuous. Institutional theory emphasizes rational myth isomorphism and legitimacy, which are institutions imitating rather than necessarily optimizing their decisions, practices and structures organizations adapt other organizations' way of conducting activities in a particular community for conformity (Scott 2004; 2008). Kraft and Furlong (2007) argue that the institutional theory is policy making that emphasizes the formal and legal aspects of government structures. Therefore, institutions form their operating parameters on the laid down laws or policies and thus their effectiveness borders on financial, personnel capacity, and roles in a particular community.

However, Meyer and Rowan (1997) noted that the cognitive and cultural explanation of social and organizational phenomena which considers the properties of supra individual units of analysis cannot be reduced to aggregations or direct consequences of individual attributes or motives.

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Therefore, in order to survive, institutions must conform to the rules and beliefs (Scott 1995). Systems prevailing in the environment, both structural and procedural will earn the institutional legitimacy. Social, economic and political factors constitute an institutional structure of a particular environment which provides it with advantages for engaging in specific types of activities. Hence, they thrive if they receive the institutional support. Therefore, the legislations are made by institutions and it is these institutions that help in enforcing the laws made, that is coordinating and thereby being involved to see to it whether they are effective or not. It is on this ground that this study fits and used this theoretical framework.

## 2.0 Description of the Study Area

Mkushi District is located in the Central Province of Zambia and covers an area of about 17,726 km$^2$ (Manwesha, 2012) and is approximately 319 km from Zambia's Capital city, Lusaka. Administratively, Mkushi District is divided into 14 wards.
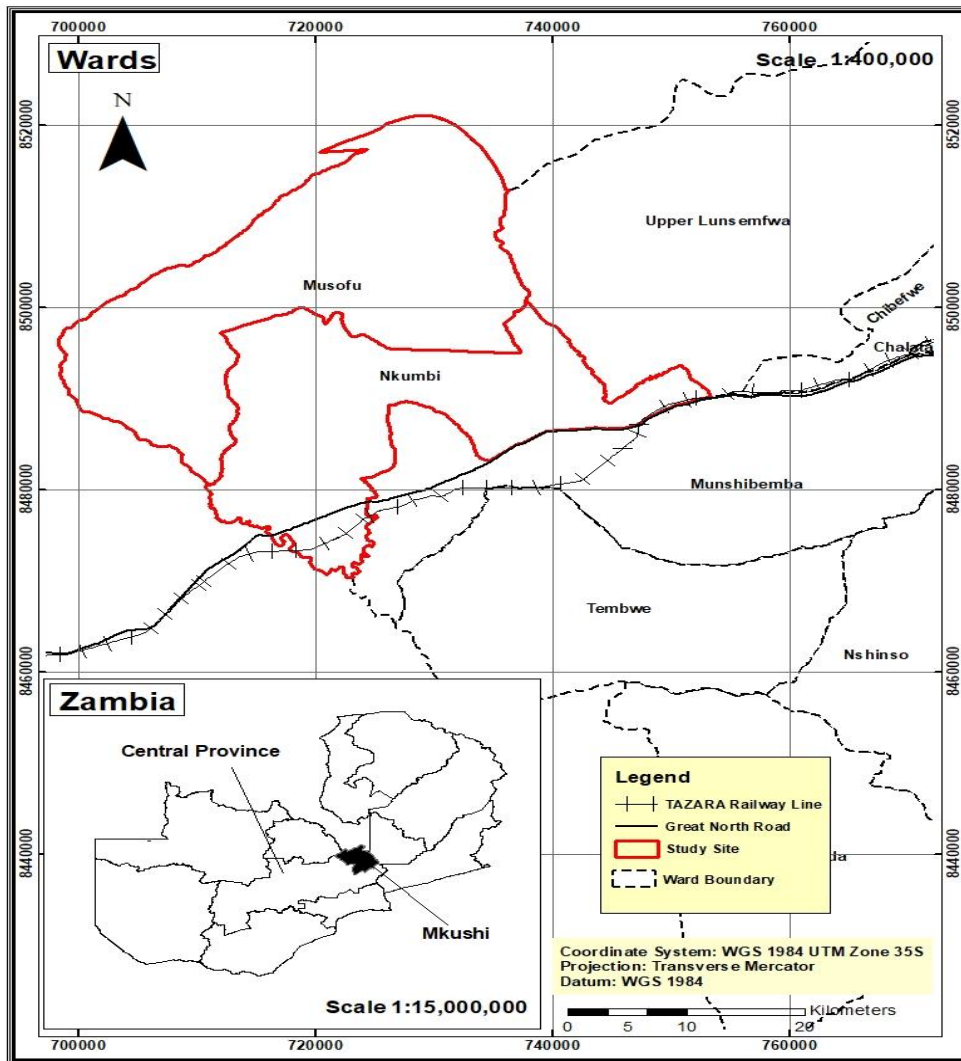
*Figure 1: Location of the study area and study sites (Nkumbi and Musofu)*

**Source: Author (2020)**

Mkushi lies on the latitude 8490000 South 756000 east and Longitude 8500000 degrees 746000 East (CSO, 2016). The district experiences a subtropical type of climate despite it being in the tropics. It is representative of conditions found in the high rainfall region of Zambia. The climate is seasonal consisting of a cool and dry season from May to August, a hot and dry season from September to October and a warm and wet season from November to April. Mkushi lies at 1100m to 1300m altitude. The mean annual temperature for Mkushi is 19.3°C with daily temperature ranging from 14.6°C in July to 33.1°C in October. The mean daily maximum temperatures in Mkushi is 20 C (range: 10°C in June to 33.1°C in October) and the mean daily minimum temperature is 10.9°C (range: 13°C in July to 23°C in December), with an average of 24°C.

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Mkushi District has an estimated total population of 271,239 of which 113,803 are males and 112,616 are females (CSO, 2013). The population density of 3.7 percent persons per square kilometer and annual population growth rate of 3.4 percent for 2011-2020 is the highest in Central Province of Zambia (CSO, 2013)

Mkushi is known for its large commercial agricultural operations and boast a substantial population of expatriate farmers who provide direct employment to the locals (CSO and Nuela 2015). Majority of the people in Mkushi District are farmers, with maize (*Zea mays*), cassava (*Manihot esculenta*) and sweet potatoes (*Lopmea batatas*) being the most cultivated crops smallholder farmers. Other common livelihoods include poultry farming, rearing of goats, and cattle, while wheat (*Triticum aestivum*), tobacco (*Nicoiana tabacum*), soyabeans (*Glycinee max*) are also grown by both commercial farmers and smallholder farmers.

## 3.0 METHODOLOGY

### 3.1 Sampling

This study used a purposive and stratified random sampling. Key informants were purposively sampled and the respondents (smallholder farmers) were randomly sampled in order to have equal prospects of the respondents in each site to be interviewed. A stratified random sampling was done on the smallholder farmers. Identification of the two study sites (Musofu and Nkumbi) was purposively done from the fourteen wards in Mkushi. The zones in the study sites were taken as the strata for stratified sampling. Each stratum had four zones from which 18 smallholder farmers were sampled using simple random sampling using the farmer register. This gave a total sample of 72 respondents in each study site. A total of 8 zones with 18 respondents sampled from each of which came to 72 respondents for each study site giving to total of 144 respondents. The key informant sample consisted of 16 key informants sampled from various institutions involved in agriculture in Mkushi District. They were selected based on their expertise in coordinating efforts to adapt to climate change. The key informants have experience with institutions that coordinate such activities. The sampled institutions included: Ministry of local government, Ministry of Agriculture and cooperatives, Ministry of lands and natural resources, Ministry of Finance, and the Ministry of national planning and development.

### 2.4 Data collection

The study used both primary and secondary data. Primary data was obtained from the field through structured interviews using a questionnaire. Secondary data was collected through the review of literature from journals, books and the internet.

### 4.4.1 *Structured Interview questionnaire*

A structured interview was used to collect information on factors affecting agriculture such as droughts, pests, floods and high temperatures. Effectiveness of institutions in coordinating climate change adaption activities was done by the use of Likert scale with rankings from 1-5 representing Very effective [5] Effective [4] moderately effective [3] Not effective [2] and Not sure [1]. This was administered to both key informants and smallholder farmers and the responses were recorded. Interviews were conducted in English particularly with key informants and literate smallholder farmers. As regards farmers with limited formal education interviews were conducted in *Bemba, Lala, Swaka* and *Nyanja* while recording the responses in English. The researcher was conversant with the major languages in the study area.

### 4.4.2 Semi –Structured Interview Guide

A semi-structured interview was used to collect data from the smallholder farmers. The tool helped collect data on climate change adaptation, and roles played by the institutions in coordinating climate change adaptation activities. This was to produce a detailed description of participants' feelings, opinions, and experiences as well as to interpret the meanings of their actions (Deville, 2008). The semi-structured interview enabled the interviewer to probe the respondents' answers in cases of a lack of clarity.

### 4.4.3 Observation

The study utilized a non-participatory observation where the researcher observed while remaining independent from the group being observed. Observation was conducted throughout the field, while taking photographs and notes. This method complemented information from other data collection methods, and also validated the information gathered by other data collection methods that was employed in the field. Through observations, the researcher could tell that many smallholder farmers had low capacity to adapt, labour to cultivate and manage the effects of fall army worms in their fields. There were no NGOs and civil society organizations fostering CCA in

the district, only the camp officers from the ministry of agriculture who were heavily constrained by funding to facilitate their operations.

## 2.5 Data Analysis

The study used both quantitative and qualitative analysis. The quantitative data was analyzed using the Chi-square test to assess the responses from the two sample groups namely; key informants and the smallholder farmers' respondents on their perceptions on institutional effectiveness towards institutional effectiveness on coordinating CCA. A 5-pointer Likert Scale was employed to collect data from respondents from which the Chi-square test was conducted. Qualitative data involving demographics and socio-economic characteristics, as well as the perceptions of smallholder farmers on the effectiveness of key institutions steering climate change adaptation were analyzed through thematic analysis and results presented in table form. Thematic analysis involved grouping of responses that fell in similar categories or themes. The main advantage of thematic analysis is that it helps in data collected being reduced and simplified to specific themes or topics, while at the same time producing results that may then be measured using quantitative techniques (Shampoo and Resnik, 2003). The statistical operations were conducted in SPSS 23 and Microsoft Excel 2016 for the quantitative data using a Chi-square at probability level, $P = 0.05$.

## 3.0 RESULTS AND DISCUSSION

The study sort to achieve the following objectives: Loopholes in the legislation on the coordination of climate change activities in Mkushi District, Institutional effectiveness in coordinating climate change adaptation activities, and the roles of institutions in coordinating climate change activities CCA.

### 3.2    Loopholes in the legislation on the coordination of climate change activities

On the inadequacies of legislation on CCA activities, majority (56.3 percent) of the key informants perceived the inadequacies to exist at national level, while 25 percent perceived that the inadequacies exist at local level. The rest of the key informants (18.8 percent) indicated that the inadequacies in legislation exist at provincial level. Further, about 43.8 percent of the respondents proposed that government should revise policies and Acts and enact them into law (Figure 3). Other respondents (31.3 percent) proposed that the government should decentralise CCA coordination in the quest to give power to districts for adaptation funding. Some of the respondents

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(12.5 percent) pointed out that decentralisation of CCA would enable institutions mandated to carry out their roles, thereby putting in place effective monitoring and supervisory system.
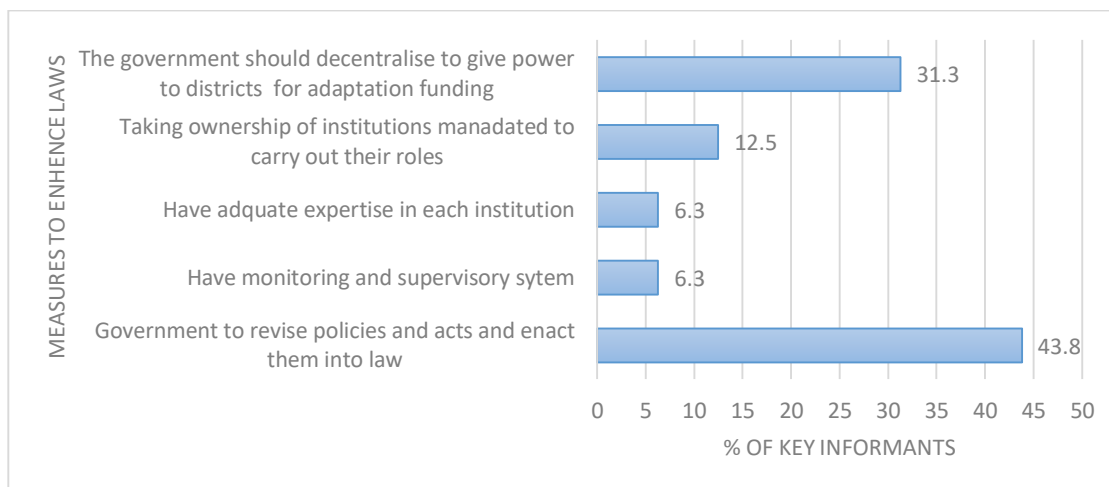


**Figure 3: Inadequacies in the laws and measures to enhance them**

## 3.3 Institutional effectiveness in coordinating climate change adaptation activities.

The study used the following indicators to measure the perceived effectiveness of institutions in coordinating climate change adaptation activities. (i) Training of local farmers to adapt and detect early warning signs of droughts, diseases and poor rainfall or floods (ii) Funding of communities affected by climate change risks. (iii) Encourage climate smart agriculture and crop diversification. (iv) Promoting of Conservation Farming Methods. (v) Promote horticulture and drought resistant crops. This was done by getting data from the key informants from the institutions coordinating CCA (experts) and the respondents who are the smallholder farmers who are direct affected by climate variabilities. Their responses then were measured using the Chi square test for association.

### 3.3.1 Training of Smallholder Farmers
Most of the respondents felt that institutions were effective in training of local farmers (50 percent for key informants; 36.8 percent for smallholder farmers) (Table 2). The key informants' perceptions on the effectiveness of CCA activities was ranked as follows: 25 percent for very effective and 25 percent for not sure.

*Table 2: Training of Local Farmers to Adapt and Detect Early Warning Signs of Droughts, Diseases and Poor Rainfall or Floods*

| Rank | Key Informants | | | | Farmers | | | |
|---|---|---|---|---|---|---|---|---|
| | Freq. | % | Valid % | Cumulative % | Freq. | % | Valid % | Cumulative % |
| Not sure | 4 | 25.0 | **25.0** | 25.0 | 35 | 24.3 | **24.3** | 24.3 |
| Not effective | 0 | 0.0 | **0.0** | 25.0 | 11 | 7.6 | **7.6** | 31.9 |
| Moderately effective | 0 | 0.0 | **0.0** | 25.0 | 18 | 12.5 | **12.5** | 44.4 |
| Effective | 8 | 50.0 | **50.0** | 75.0 | 53 | 36.8 | **36.8** | 81.2 |
| Very effective | 4 | 25.0 | **25.0** | 100.0 | 27 | 18.8 | **18.8** | 100.0 |
| **Total** | **16** | **100.0** | **100.0** | **250** | **144** | **100.0** | **100.0** | **281.8** |
| **Chi-square Test for key informants** | | | : Value= 2.000   df=2 | | | p-value=0.368 | | |
| **Chi-square Test for smallholder farmers** | | | :Value= 36.833 df=4 | | | p-value=0.001 | | |

**Source: Field Data 2020**

Generally, the results show that key informants found the training conducted by institutions to be effective ($X^2$ = 2.000; df = 2; P-value=0.368). Contrasting results were obtained from the Chi-square test conducted for farmers ($X^2$ = 36.833; df = 4; P-value=0.001) who felt that the training of smallholder farmers was not effective. One farmer said that *"The camp and extension officers are not enough as one extension officer has 3000 farmers in each zone and these extension officers have no funds to carry out their work, so for them to attend to us we contribute money to buy fuel for them."*

### 3.3.2 Funding Communities Affected by Climate Change Risks

Table 3 show the perceptions of farmers and key informants with regard to institutional effectiveness in funding communities. For farmers, the most common ranking was *not effective* (35.4 percent), while most key informants felt institutions were either *not effective (31.3 percent) or were not sure (*31.3 percent). The farmers' perceptions ranking for  *not sure* responses were 26.4 percent for each ranking while the responses of the key informants for *moderately effective* and *effective* accounted for 18.8 percent each respectively (refer to table 3).

*Table 3: Funding of Communities Affected by Climate Change Risks*

| Rank | Key Informants | | | | Farmers | | | |
|---|---|---|---|---|---|---|---|---|
| | Freq. | % | Valid % | Cumulative % | Freq. | % | Valid % | Cumulative % |
| Not sure | 5 | 31.2 | **31.2** | 31.2 | 38 | **26.4** | 26.4 | 26.4 |
| Not effective | 5 | 31.2 | **31.2** | 62.5 | 51 | **35.4** | 35.4 | 61.8 |
| Moderately effective | 3 | 18.8 | **18.8** | 81.2 | 34 | **23.6** | 23.6 | 85.4 |
| Effective | 0 | 0.0 | **0.0** | 81.2 | 17 | **11.8** | 11.8 | 97.2 |
| Very effective | 3 | 18.8 | **18.8** | 100.0 | 4 | **2.8** | 2.8 | 100.0 |
| **Total** | **16** | **100.0** | **100.0** | **355.9** | **144** | **100.0** | **100.0** | **37.8** |
| **Chi-square Test for key informants: Value= 23.132       df=3       p-value=0.002** | | | | | | | | |
| **Chi-square Test for farmers          : Value=7.181       df=4       p-value=0.001** | | | | | | | | |

**Source:  Field data, 2020**

The results show that key informants perceived that funding to communities affected by climate change risks was not effective ($X^2 = 8.132$; df=3; P-value=0.002). Similarly, smallholder farmers perceived that funding of communities affected by climate change was not effective ($X^2 = 7.181$; df= 4; P-value=0.001). This implied that both key informants and farmers were not content with the funding to communities affected by climate change impacts in Mkushi. One of the of the key informants observed that *"The reduction of budget allocation to the Ministry of Agriculture of late has affected the operation in Mkushi District as the district depend on cooperatives' contributions and for the whole year 2019 only ZMW10,000 ($562) was received in December."* The key informant further pointed out that this is evident in the outbreak of fall army worms where many smallholder farmers have no funds nor receive funds from government which makes them loose their crops.

### 3.3.3 Supporting farmers to engage in Climate Smart Agriculture and Crop Diversification

Table 4 shows the perceptions of farmers and key informants with regard to institutional effectiveness in encouraging climate smart agriculture and diversification. For the farmers, the most common ranking was *moderately effective* (35.4 percent), while that for key informants was *not sure* (31.3 percent). The second most common ranking by farmers and key informants were *not sure* (25.2 percent) and *moderately effective* (25 percent), respectively.

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*Table 4: Encourage Climate Smart Agriculture and Crop Diversification*

| Rank | Key Informants | | | | Farmers | | | |
|---|---|---|---|---|---|---|---|---|
| | Freq. | % | Valid % | Cumulative % | Freq. | % | Valid % | Cumulative % |
| Not sure | 5 | 31.2 | **31.2** | 31.2 | 41 | 28.5 | **28.5** | 28.5 |
| Not effective | 3 | 18.8 | **18.8** | 50.0 | 33 | 22.9 | **22.9** | 51.4 |
| Moderately effective | 4 | 25.0 | **25.0** | 75.0 | 40 | 27.8 | **27.8** | 79.2 |
| Effective | 2 | 12.5 | **12.5** | 87.5 | 29 | 20.1 | **20.1** | 99.3 |
| Very effective | 2 | 12.5 | **12.5** | 100.0 | 1 | 0.7 | **0.7** | 100.0 |
| **Total** | **16** | **100.0** | **100.0** | **343.7** | **144** | **100.0** | **100.0** | **358.0** |
| **Chi-square Test for key informants: Value= 2.125   df=4      p-value= 0.713** | | | | | | | | |
| **Chi-square Test for farmers         : Value= 45.497  df=4      p-value= 0.001** | | | | | | | | |

**Source: Field data, 2020**

Key informants found that institutional support towards farmer engagement in climate smart agriculture and crop diversification was effective ($X^2$ = 2.125; df=4; P-value=0.713). Contrasting results were obtained from the Chi-square test conducted for farmers ($X^2$ = 45.497; df= 4; P-value=0.001). This implied that of the two groups, only key informants were not content with the results of institution's support towards encouraging climate smart agriculture and crop diversification among smallholder farmers.

However, one key informant from the Ministry of Agriculture acknowledged that *"There are numerous challenges faced by smallholder farmers to adopt climate smart agriculture due to low capacity of specialized officers at the district level such as extension methodologists, farm management officers, irrigation officers, nutritionist and climate change specialists."* This was reported to have made it difficult for smallholder farmers to adapt to CCA.

### 3.3.4 Promote Conservation Farming

Table 5 shows the perceptions of farmers and key informants with regards to institutional effectiveness in promoting conservation farming. While the majority of the smallholder farmers (36.1 percent) rated the institutions' promotion of agriculture as *effective,* the majority of the key informants (43.8 percent) were *not sure.* The proportion of farmers that reported *very effective* was 20.8 percent indicating second largest under this category of respondents. On the other hand, an equal proportion of key informants reported *effective* and *very effective* (each with 18.8 percent).

*Table 5: Promoting of Conservation Farming Methods*

| Rank | Key Informants | | | | Farmers | | | |
|---|---|---|---|---|---|---|---|---|
| | Freq. | % | Valid % | Cumulative % | Freq. | % | Valid % | Cumulative % |
| Not sure | 7 | 43.8 | **43.8** | 43.8 | 27 | 18.8 | **18.8** | 18.8 |
| Not effective | 2 | 12.5 | **12.5** | 56.2 | 10 | 6.9 | **6.9** | 25.7 |
| Moderately effective | 1 | 6.2 | **6.2** | 62.5 | 25 | 17.4 | **17.4** | 43.1 |
| Effective | 3 | 18.8 | **18.8** | 81.2 | 52 | 36.1 | **36.1** | 79.2 |
| Very effective | 3 | 18.8 | **18.8** | 100.0 | 30 | 20.8 | **20.8** | 100.0 |
| **Total** | **16** | **100.0** | **100.0** | | **144** | **100.0** | **100.0** | **266.8** |
| **Chi-square Test for key informants: Value= 6.500    df=4    p-value= 0.165** | | | | | | | | |
| **Chi-square Test for farmers     : Value= 31.625    df=4    p-value= 0.001** | | | | | | | | |

**Source: Field Data, 2020**

The results show that key informants found the conservation farming methods promoted in Mkushi to be not effective ($X^2 = 6.500$; df=4; P-value=0.165) while contrasting results were obtained from the Chi-square test conducted for farmers ($X^2 = 31.625$; df= 4; P-value=0.001). On the contrary, smallholder farmers accepted that promotion of conservation farming among them is effective. However, one smallholder farmer insisted that, *"Conservation farming is very labour intensive and the government does not reciprocate in giving good price to the produce of such kind of farming, hence many of us do not practice it despite it being promoted among smallholder farmers in Mkushi.*

### 3.3.5 Mobilizing Funds for Communities Affected by Climate Change Effects

Table 6 shows the perceptions of smallholder farmers and key informants with regard to institutional effectiveness in mobilizing funds for the affected communities. While the majority (36.1 percent) of the smallholder farmers were not *sure,* the majority of the key informants reported *not sure, effective* and *very effective* in equal proportions of 25 percent for each response. Smallholder farmer's rankings were seconded by *moderately effective* (12.5 percent), while that of key informants was seconded by *not effective* and *moderately effective* with each response category having a proportion of 12.5 percent.

*Table 6: Mobilizing Funds for Communities Affected by Climate Change Effects*

| Rank | Key Informants | | | | Farmers | | | |
|---|---|---|---|---|---|---|---|---|
| | Freq. | % | Valid % | Cumulative % | Freq. | % | Valid % | Cumulative % |
| Not sure | 4 | 25.0 | **25.0** | 25.0 | 52 | 36.1 | **36.1** | 36.1 |
| Not effective | 2 | 12.5 | **12.5** | 37.5 | 25 | 17.4 | **17.4** | 53.5 |
| Moderately effective | 2 | 12.5 | **12.5** | 50.0 | 35 | 24.3 | **24.3** | 77.8 |
| Effective | 4 | 25.0 | **25.0** | 75.0 | 31 | 21.5 | **21.5** | 99.3 |
| Very effective | 4 | 25.0 | **25.0** | 100.0 | 1 | 0.7 | **0.7** | 100.0 |
| **Total** | **16** | **100.0** | **100.0** | **287.5** | **144** | **100.0** | **100.0** | **691.7** |
| **Chi-square Test for key informants: Value = 38.171  df=4  p-value = 0.002** <br> **Chi-square Test for farmers     : Value = 47.181  df=4  p-value  = 0.001** | | | | | | | | |

**Source: Field Data, 2020**

The results show that key informants found that the mobilization of funds for CCA activities to be not effective ($X^2 = 38.171$; df=4; P-value=0.002). Similar results were obtained from the Chi-square test conducted for smallholder farmers ($X^2 = 47.181$; df= 4; P-value=0.001). One smallholder farmer asserted that, *"The cooperative has no capacity to mobilize funds for all the members but only a few as not all are able to make contributions unless the subsidies which others fail to pay too"*. This meant that failure to pay, the smallholder farmers especially those who have no access to subsidised farming inputs were threatened with food insecurity. One of the smallholder farmer observed that even though some smallholder farmers opt to do gardening and charcoal production, they were not sustainable therefore, the implication is that the diversified production as a way of adaption strategy is not actualized.

### 3.3.6 Promote Horticulture and Drought Resistant Crops

Table 6 shows the perceptions of farmers and key informants with regards to institutional effectiveness in promoting horticulture and drought tolerant crops. While the majority of the smallholder farmers (28.5 percent) reported *not sure,* the majority of the key informants (44.4 percent) reported *not effective.* The smallholder famers' most common response was *moderately effective* consisting of 27.8 percent, while that of key informants were *effective* and *very effective* each with having 22.2 percent.

*Table 6: Promote Horticulture and Drought Resistant Crops*

| Rank | Key Informants | | | | Farmers | | | |
|---|---|---|---|---|---|---|---|---|
| | Freq. | % | Valid % | Cumulative % | Freq. | % | Valid % | Cumulative % |
| Not sure | 7 | 43.8 | **43.8** | 43.8 | 41 | 28.5 | **28.5** | 28.5 |
| Not effective | 4 | 25.0 | **25.0** | 68.8 | 33 | 22.9 | **22.9** | 51.4 |
| Moderately effective | 1 | 6.2 | **6.2** | 75.0 | 40 | 27.8 | **27.8** | 79.2 |
| Effective | 2 | 12.5 | **12.5** | 87.5 | 29 | 20.1 | **20.1** | 99.3 |
| Very effective | 2 | 12.5 | **12.5** | 100.0 | 1 | 0.7 | **0.7** | 100.0 |
| **Total** | **16** | **100.0** | **100.0** | | **144** | **100.0** | **100.0** | |
| **Chi-square Test for key informants: Value = 7.125      df =4        p-value = 0.129** **Chi-square Test for farmers              : Value = 36.972   df =4     p-value = 0.001** | | | | | | | | |

**Source: Field Data, 2020**

The results show that key informants found the promotion of horticulture and drought-tolerant crops to be not effective ($X^2$ = 7.125; df=4; P-value=0.129). Contrasting results were obtained from the Chi-square test conducted for smallholder farmers ($X^2$ = 36.92; df= 4; P-value=0.001). This implied that of the two groups, only key informants were not content with the promotion of horticulture and drought-tolerant crops (such as cassava). For example, in 2017 the Conservation Farming Unit in conjunction with the Ministry of Agriculture promoted conservation agriculture techniques such as basin conservation agriculture and pot-holing amidst intermittent rainfall. However, the project was not sustainable because after the funder pulled out, the smallholder farmers stopped practicing it. Furthermore, one farmer said that "*The government does not consider drought tolerant seed when they distribute seeds under the farmer input support programme*". This means that smallholder farmers who are dependant on rain fed agriculture face challenges in adapting to climate change variabilities as the distribution of inputs by the government through the MACO does not take that into consideration.

## 3.1 Farmers' perceptions of roles of institutions in coordinating climate change activities

Majority of the farmers (70.8%) felt that the institutions' major role was to train farmers in aspects of agriculture (Figure 3). Only 9% felt institutions were also supposed to provide boreholes while 4.9% thought that institutions' roles included provision of drought tolerant crop varieties. Notably,

there were no farmers who indicated that institutions' roles also included coordinating climate change adaptation activities.
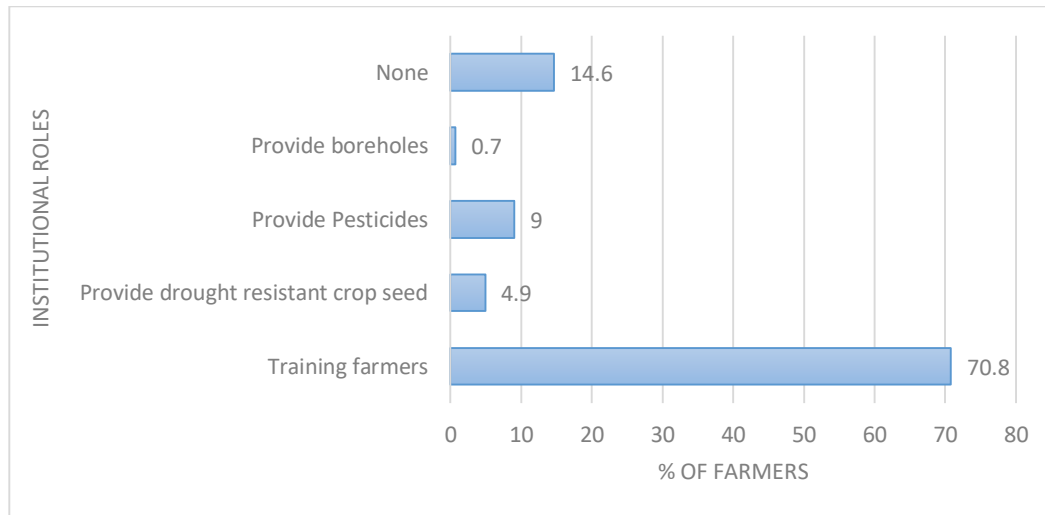


**Figure 2: Farmers' perceptions on roles by institutions**

The data revealed that 37.5 percent of the institution role was to provide financial aid (Table 7). This is usually done by training smallholder farmers through cooperatives. The other role that was reported is: sensitization to masses through radio and television, technical development in crop and seed varieties; and financing, supervising and monitoring. However, a few small holder farmers get to know about the weather, rainfall patterns for each season through radio and television while many of them is through agriculture camp officers interface. The sensitization is done mostly before and during the agriculture season.

*Table 7:  Institutional roles and how coordination is done in CCA*

| Institutions Involved | Institutional roles | | Percent | How institutions coordinate CCA activities | | Percent |
|---|---|---|---|---|---|---|
| MoF MLGH | To provide financial aid | | 37.5 | Community based capacity building through district officers | | 19.1 |
| MLNR & MLGH | Monitoring and evaluation of projects in communities | | 12.5 | Community awareness through district officers | | 31.8 |
| MLNR | Disseminate knowledge  on CCA | | 25.0 | Sensitization through print and electronic media | | 18.8 |
| MACO & PPCR | Promote climate smart agriculture through conservation farming | | 18.8 | Technical development in crop and seed varieties | | 18.8 |
| MoF & MLGH | It is a conduit of finances to affected communities | | 6.2 | Financing | | 12.5 |

Source: Field data, 2020

## 4.2 Role of institutions in the co-ordination of CCA activities in Mkushi.

The role of institutions in climate change adaptation includes dissemination of knowledge and promotion of climate smart agriculture through conservation farming, provision of fiscal aid and monitoring and evaluation of projects in the residential districts and that they were a conduit of finances for affected communities. Among the smallholder farmers interviewed, the provision of financial assistance and the dissemination of information on Community projects was the most notable. The National Climate Change Policy (2016) recognizes that awareness and education through the dissemination of climate change information is needed to mitigate and adapt. Agrawal *et al*., (2009) agrees that, information gathering and dissemination, resource mobilization and allocation, skills development and content building, providing leadership, and connecting to other decision making depends on the institutions present in the region. Much as the study area had cooperatives, in some instances, for smallholder farmers to access the extension services they have

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to contribute funds for fuel for a camp officer to provide services in their respective cooperatives zones.

The institutions coordination of the CCA activities, was purely community based, because the climate impacts are locally understood and experienced. Adaptation practices among smallholder farmers depend on their access to specific institutional arrangements since adaptation never occurs in an institutional vacuum. Institutional connections provide households and communities greater flexibility in their choice of diversification and adaptation strategies. This was true as evidenced from the results where smallholder farmers agreed that institutions help in training them on various agriculture aspects. To agree with the above assertion, the key informants recommended that matching policy and the financial support will help them adapt to CCA response. The study by Mpasuka (2013) on policy framework in Malawi found that most institutions have great challenge of finances as the policies state, the inadequacy of funds to implement strategies for adaption has failed, in many instances, the finances budgeted for by each line ministry towards CCA does not meet the demand in time of emergencies such us floods, droughts and poor rainfall. This agrees with the key informant's solution to challenges of matching policies and funding for institutions to be effective. This means that a participatory approach in CCA is crucial in engaging communities toward the process of technology receptivity and sustainable CCA activities. Further, it is believed that, where district adaptation communities propose projects, and receive funding according to pre-determined criteria, it enhances adaptation efforts relevant to the local communities and reduces time and cost of getting funds into action for the beneficiaries.

Farmers reported training of farmers, provision of drought resistant crop seed, pesticides and boreholes as the roles of the institutions coordinating CCA activities. Of these roles, training of farmers was rated as the most significant to farmers. Rosemary (2011) observed that adaptation strategies based on knowledge and lessons learned promotes sustainable agricultural practices and climate change adaptation strategies. However, this can be refuted in that it is hard to coordinate CCA because some farmers are illiterate such that sending messages o any warning be it on floods, droughts are not possible as they need interface. This proved to be a barrier in disseminating information on weather forecast until there is an interface by the agriculture extension officers. The farmers also provided possible solutions and suggested that institutions should improve their

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coordination of CCA activities through institutional capacity building with new criteria of decision making towards sustainable adaptation activities for the communities.

## 4.4 Legislation on the coordination of climate change activities in Mkushi

Five research questions were used as a measure of effectiveness of CCA activities with regard to legislation; Do institutions have binding laws or policies on coordination of climate change adaptation activities? If the institutions have the binding laws what is the explanation for why they have them? What inadequacies exist in the law for coordinating climate change activities and the levels at which they exist? What should be done to enhance the laws in coordinating climate change adaptation activities?

From the key informants point of view, there are existing binding laws or policies on CCA activities. Arguably, finance and planning mechanism for CCA is anchored in the architecture of government decentralisation and through which climate funds reach local communities. The Zambia National Agricultural Policy 2012-2030 guides the operations of the CCA activities in the agriculture sector. The perceived inadequacies in legislation was at national level. Nest and Chipo and Paramu (2017) suggested that lack of constitutional embedded laws on the operation of institutions coordinating CCA leads to inefficiency in the delivery of services for the most vulnerable communities. Some measures where proposed to enhance the laws in coordinating CCA activities with the largest representation being: government to revise policies and acts and enact them into law; and that the government should decentralise the coordinating institutions so that at local level, they are able to implement the strategies in relation to climate change adaptation.

Ampaire *et al.* (2017) refuted the (NAPA, 2007) that "decentralization will be transparent in policy making and implementation with effective community participation in decision making and administering of their local affairs while maintain sufficient linkages between the centre and the periphery." They argued that it is a far-fetched reality as most decisions are made by the central government and mostly by the DMMU towards climate change risks and disasters such as floods, droughts, low rainfall to vulnerable communities who have no capacity to adapt. This is evidenced by the once off adaptation measure on conservation farming by farmers in Mkushi by the conservation farming unit, notably, in most cases working with existing community institutions yields positive results, rather than establishing new ones. Therefore, lasting adaptation is achieved

when national and district level institutions provide a supporting environment for people's own adaptation.

This study found that there is lack of connection between national policies on climate change adaptation and the local institutional situation on the ground with limited involvement of local institutions. It is worth noting that the insufficient legislation on climate change, has to some extent affected and weakened the ability to adapt to climate change effects by the smallholder farmers. This is due to the institutional lapses and absence at local level.

### 4.5 Institutional effectiveness in coordinating climate change adaptation activities

For both farmers and key informants the ranking of institutions as being effective was the most common ranking with regards to training of local farmers, while promotion of climate smart agriculture, mobilizing funds for affected communities, promotion of hot culture and drought tolerant crops and conservation farming and funding of affected communities was not effective respectively.

### 5. CONCLUSION

There was weak implementation (the responses towards climate induces hazards on local communities) are only approved by the Disaster Management and Mitigation unity (DMMU) in Lusaka, as controlling officers on climate change are only at national level, this in turn affected the coordination of CCA activities and their implementation at local level. However, decentralisation during the formulation of the laws so as to allow local people have an input on what really affect them at the grass-root thus will help in the implementation of CCA activities was to be more effective. There was generally moderate effectiveness in the coordination of CCA activities in Mkushi with training of farmers being highly ranked. In order to improve the CCA activities in Mkushi, government should consider employing more agriculture officers to interface with smallholder farmers so as to help them adapt well to the climate change variabilities. This should come with increased funding to the line institutions so as to enhance coordination. It is therefore, recommended that, for institutions to perform well, there is need to decentralize the institutional operations to local level and enact laws that shall give power to local institutions to carry out their roles in CCA activities.

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